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Abridged Building CODE

1955 edition

Building Officials Conference of America, Inc.

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Abridged Building CODE

of the

Building Officials Conference of America, Inc.

1955 edition

Building Officials Conference of America, Inc.
110 East 42 Street, New York 17, N. Y.

BOCA

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ABRIDGED BUILDING CODE COMMITTEE

The original committee which compiled the Abridged Building Code was composed of a chairman and seven building officials from small and medium sized communities from several areas of the country. Walker S. Lee, Commissioner, New York State Building Code Commission, served as Chairman. Albert H. Baum, Building Commissioner, St. Louis, Missouri, General Chairman of BOCA Basic Code Committee was an Ex-Officio member; and George E. Strehan, Correlator of the Basic Building Code, served as Correlator.

A separate committee of ten building officials constituted the ABRIDGED BUILDING CODE COMMITTEE OF REVIEW. This committee carefuly studied the proposed code and consulted with industry and trade association representatives before the code was finally submitted to the membership of the Conference for approval.

BASIC CODE COMMITTEE

In order to maintain the high caliber of the BOCA Building Codes, the Executive Commitee has established a permanent BASIC CODE COMMITTEE. This committee is charged with reviewing matters of principle and policy pertaining to the codes and the establishing of procedures for maintaining them in step with developments in the construction industry. The committee reports directly to the Executive Committee and is required to report its activities to the membership at the annual meeting of the Conference.

MEMBERS OF THE BASIC CODE COMMITTEE

ALBERT H. BAUM, *Building Commissioner, St. Louis, Missouri; General Chairman.*

ARTHUR N. RUTHERFORD, *Building Inspector, West Hartford, Connecticut; First Vice President.*

WILLIAM G. WHARTON, *Building Commissioner, Richmond, Virginia; Second Vice President.*

FRANK C. ROE, *Director of Public Works, Clayton, Missouri; Chairman, Code Changes Committee.*

FRANK J. DROGOSCH, *Chief Safety Engineer, Detroit, Michigan; Chairman, Material Approvals Committee.*

C. E. PETERSON, *Chief Inspector, Hutchinson, Kansas; Member-at-Large.*

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PREFACE TO FIRST EDITION (1950)

Application of Code.—The objective of the Abridged Building Code is to make the effective regulation of building construction possible in municipalities where the facilities for administering building laws may be inadequate, or in which there is no qualified enforcing official to adapt the provisions of the more comprehensive Basic Building Code to the solution of local building problems. It establishes minimum requirements for safe construction of buildings and structures within the limited range of building operations common in those communities which are principally residential. It is complemental to the Basic Building Code of the Building Officials Conference of America, Inc. Larger projects which may be built in such smaller political subdivisions or which involve structural steel, reinforced concrete or other design of more intricate technical character, will be governed by the provisions of the Basic Building Code.

Adoption of Code.—Under the police power delegated by the state, every local community has the authority and is invested with the implied responsibility to safeguard the life and welfare of the individual and the community as a whole from structural, fire and sanitary hazards due to unsafe and improperly planned building construction. The Abridged Building Code is not a complete building code, but it does provide minimum requirements to govern the erection of safe housing for dwelling purposes and for the smaller business and community buildings incidental to local civic life and activities. Where the necessary state enabling acts have been provided, this code can be adopted by reference in those municipalities which either have no code at all, or which are operating under codes that are outmoded or restrictive in their provisions. The ABC is also recommended to banks and other financial institutions and to architects, engineers, real estate developers and builders generally, for guidance in the design of safe, economical and standard building construction.

Recognized Standards.—While the provisions do not depart from the fundamental principles of functional performance requirements underlying the Basic Building Code, they are formulated in more direct terms to cover recognized construction methods. In order to condense the text and to eliminate details insofar as possible, the recommendations of accepted engineering practice as defined by the standards of recognized, authoritative governmental research and testing organizations are incorporated by reference in appendixes A and B. Each municipality which adopts the Abridged Building Code must maintain a file, for the use of the public, of all such accredited data and specifications. The code has been prepared in sufficiently flexible form to adapt itself to all new developments in the building industry and to permit the use of all safe materials and approved methods of construction which are found adequate for the intended use.

National Housing Program.—Realizing the significance of BOCA's constructive program for building code reform and its impact on the national housing problem, the National Association of Home Builders has given its full support to the work. The Building Code Committee of that organization actively participated in joint sessions with the ABC Code Committee and assisted in the drafting of the provisions. The original draft approved by the joint committee of BOCA and NAHB, was ratified by BOCA at the annual meeting held in New York City on September 16, 1948. Since then some three thousand copies of the adopted draft have been made available on request to communities throughout the states to meet the national emergency situation; and the ABC was adopted as the official building code in many jurisdictions of one thousand to fifteen thousand population in the States of New York, Massachusetts, Pennsylvania, Florida, Michigan and Missouri among others. The first printed edition now being released has been correlated to the comprehensive Basic Building Code ratified by the Building Officials Conference of America, Inc., at its 1949 convention held in Washington, D. C.

Walker S. Lee, *Chairman*
Abridged Building Code Committee

November 2, 1949.
Amended, December 1, 1954.

PREFACE TO SECOND EDITION (1955)

In 1950 the Building Officials Conference of America first published its building codes, culminating an effort of five to six years of extensive study. Of necessity some of the requirements may have been based on standards of earlier date than the latest revision prevailing at the time of publication of the codes and some were based on data recognized and proved at that time even though it may have been evident that such data was in the process of being revised.

As a consequence of the use of the codes and subsequent developments and research in the construction industry, certain changes and adjustments appeared desirable. As the number of proposals for changes increased it became necessary to carefully screen them to determine which might improve the codes and which might weaken them. To accomplish this, procedures were established and a committee with seven subcommittees was created for the purpose of reviewing the proposed changes and publicly hearing the evidence—pro and con—in support of them. This procedure provided for publicising the proposed changes, the committees' recommendations and the final action of the membership.

A number of such proposed changes were submitted in 1952, 1953 and 1954. These were published and submitted to public hearing before the committee; the committee's recommendation for each was published in advance of final consideration; and the final decision was reached before an assembly of the membership of the Conference after being further discussed in public. The decision was determined by the vote of building official members only.

This second edition of the Abridged Building Code has been revised to incorporate these changes in order to make the benefits from this thorough procedure available to local communities. By this means the entire BOCA program may become also the program of the local community and the careful, painstaking review by BOCA backs the community government in its adoption of this new code.

The BOCA building code program provides for annual consideration of proposed changes and for the publication of those finally approved in the form of an annual supplement in the interim years between new editions. These supplements will be available in August or September of each year. The adoption of them by communities which have adopted the BOCA Building Codes will result in the local codes of those communities being constantly in step with developments in the construction industry.

ALBERT H. BAUM, *Chairman*
Basic Code Committee

December 1, 1954.

EDITORIAL NOTE

In order to make the Abridged Building Code agree with changes approved for the Basic Building Code, where applicable, some editorial changes not appearing in the Supplement to the Abridged Code have been included in this edition. For the benefit of any who may be concerned, these are listed as follows:

Sec. 101.0. *Definition of "standard fire test" changed to show ASTM designation in lieu of ASA designation to correspond with listing and standard references in Basic Code.*

Sec. 107.62. *Title corrected to correspond with change in section* 416.0 *of the Basic Code.* (*Change* 38-53)

Sec. 108.21. *Additional paragraph inserted to correspond to change in section* 611.31 *of the Basic Code.* (*Change* 54-53)

Appendix B. List of Fire Test Standards added to correspond to appendix G of the Basic Code.

Appendix E-1. *Note g for table* 5 *changed to correspond to change in notes for table* 5 *of the Basic Code.* (*Change* 1-52)

Appendix E-2. *Notes for table* 6 *changed as follows to correspond to changes in notes for table* 6 *of the Basic Code.*
(*Changes* 3-53, 4-53, 5-53 and 7-53) :

Note c deleted.
Notes b, e, f, and j changed
Notes l and m added

Corrections or clarifications, which do not affect the meaning or requirements, have been made in table 4, *and sections* 100.4, 104.8, 105.0, 111.0, 111.2, 111.4, 111.68, 112.26, 112.42 *and* 113.17.

Tables 8, 9, 10, 11, 12 *and* 13 *have been transferred to appendix D*-4 *and D*-5 *for more convenient reference*

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BOCA Abridged Building Code

SECTION 100.0. SCOPE

The provisions of this code shall govern the design, construction, alteration, demolition and moving of all buildings and structures specified in section 100.2 and their service equipment. They shall apply to existing and proposed buildings as herein provided except as such matters may be otherwise prescribed in the statutes of the State of [*name of state*] or in the municipal charter or other local ordinance of [*name of municipality*].

100.1. Title.—These regulations shall be known and cited as "The Building Code of [*name of municipality*], State of [*name of state*]"; and shall be construed to secure their expressed intent and to insure public safety, health and welfare insofar as they are dependent upon building construction.

100.2. Application of ABC. — All buildings and structures hereafter erected, altered, repaired, moved or demolished that are used or designed to be used for the purposes herein defined shall comply in full with the requirements of this code, including: one- and two-family and multifamily dwellings which are not more than three (3) stories nor more than forty (40) feet in height; private garages and other buildings accessory to dwellings not more than one and one-half (1½) stories nor more than fifteen (15) feet in height; and business, assembly, institutional and municipal buildings which are not more than three (3) stories nor more than forty (40) feet in height, other than buildings for high hazard uses unless specifically provided for in this code.

100.3. Application of Basic Code.—All buildings and structures which involve the use of structural steel and reinforced concrete framing; heavy timber construction; roof trusses with spans more than twenty-five (25) feet, not including trussed roof rafters; and all other buildings not specified in section 100.2 shall conform to all applicable requirements of the Basic Building Code; except that the incidental use of steel beams, girders, columns and hangers and reinforced concrete slabs and walls shall be permitted under the provisions of this code.

100.4. Compliance with Basic Building Code.—The Basic Building Code is hereby made a part of this code in respect to the matters specified in section 100.3. The plans and specifications for such structures may be referred to the Structural Bureau of the Building Officials Conference for analysis, report and recommendation as to their structural, fire and sanitary safety, and adequacy of exits for the intended use and occupancy. Three official copies of the Basic Building Code shall be maintained on file in the office of the building official for the use and guidance of the public.

100.5. Zoning Laws and Other Statutes.—Except as may be specifically provided herein, no provisions of the zoning law or any other legal statutes pertaining to the location, use or construction of building shall be nullified by the provisions of this code; but in any case, the most rigid requirements shall control the construction, equipment or location of the building or structure. All existing local ordinances or parts of ordinances in conflict with the provisions of this code are hereby repealed. Whenever state statutes require the approval of special use group buildings, including among others factories, schools and multi-family dwellings, the approval of such authorities shall accompany the application for a permit as required in section 104.2.

SECTION 101.0. DEFINITIONS

In the interpretation of this code, all words other than the terms herein specifically defined shall have their ordinarily accepted meanings as implied by the context or as customarily used in the construction industry.

ABC. The Abridged Building Code promulgated by the Building Officials Conference of America, Inc.

accepted engineering practice. That which conforms to accepted principles, tests or standards of nationally recognized technical or scientific authorities.

alley. A secondary thoroughfare less than thirty (30) feet in width dedicated for the public use of vehicles and pedestrians affording access to abutting property.

alteration. As applied to a building or structure, means a change or a re-arrangement in the structural parts or in the exit facilities; or an enlargement, whether by extending on a side or by increasing in height; or the moving from one location or position to another.

apartment house. (See dwellings.)

approved. Approved by the building official or other authority having jurisdiction.

approved rules. The legally adopted rules of the building official or of a recognized authoritative agency.

attic. The space between the ceiling beams of the top habitable story and the roof rafters.

—habitable attic. A habitable attic is an attic which has a stairway as a means of access and egress and in which the ceiling area at a height of seven and one-third (7⅓) feet above the attic floor is not more than one-third (⅓) the area of the floor next below.

basement. A portion of the building partly underground, but having less than half its clear height below the average grade of the adjoining ground. (See cellar.)

BBC. The Basic Building Code promulgated by the Building Officials Conference of America, Inc.

boarding house. (See dwellings.)

building. (See structure.) A structure enclosed within exterior walls or fire walls, built, erected and framed of component structural parts, designed for the housing, shelter, enclosure and support of individuals, animals or property of any kind.

building line. The line, established by law, beyond which a building shall not extend, except as specifically provided by law.

building official. The officer or other designated authority charged with the administration and enforcement of this code, or his duly authorized representative.

building service equipment. The mechanical, electrical or elevator equipment, including piping, wiring, fixtures and other accessories which provide sanitation, lighting, heating, ventilation, fire fighting and transportation facilities essential for the habitable occupancy of the building or structure for its designated use and occupancy.

cellar. The portion of the building partly underground, having half or more than half of its clear height below the average grade of the adjoining ground.

certificate of use and occupancy. The certificate issued by the building official permitting the occupation and use of a building in accordance with the approved plans and specifications which certifies compliance with the provisions of law for the use and occupancy of the building in its several parts together with any special stipulations or conditions of the building permit.

change of use. An alteration of a building or structure by change of use, heretofore existing, to a new use group which imposes other special provisions of law governing building construction, equipment or exits.

chimney. A primarily vertical enclosure containing one or more flues. (See flue.) (See section 113.0.)

corner lot. (See lot-corner.)

court. An open, uncovered, unoccupied space partially or wholly surrounded by the walls of a structure.

—inner. A court surrounded on all sides by the exterior walls of a structure or by such walls and an interior lot line.

—outer. A court having at least one side thereof opening on to a street, alley or yard or other permanent open space.

dormitory. (See dwelling.)

dwelling.

—one-family dwelling. A building containing one dwelling unit with not more than five (5) lodgers or boarders.

—two-family dwelling. A building containing two (2) dwelling units with not more than five (5) lodgers or boarders per family but not more than twenty (20) individuals.

—multi-family—apartment house. A building containing more than two (2) dwelling units.

—boarding house, lodging house, tourist house. A building arranged or used for lodging, with or without meals, for compensation, more than five (5) and not more than twenty (20) individuals.

—dormitory. A building arranged or used for lodging six (6) but not more than twenty (20) individuals and having common toilet and bathroom facilities.

—hotel. A building arranged or used for sheltering, sleeping, or feeding, for compensation, of more than twenty (20) individuals.

dwelling unit. One or more rooms arranged for the use of one (1) or more individuals living together as a single housekeeping unit, with cooking, living, sanitary and sleeping facilities.

exitway. The exit doorway or doorways, or such doorways together, with connecting hallways or stairways, either interior or exterior, or fire escapes, designed to provide means by which individuals may proceed safely from a room or space to a street or to an open space which provides safe access to a street.

fire division. The interior means of separation of one part of a floor area from another part together with fire-resistive floor construction to form a complete fire barrier between adjoining or superimposed floor areas in the same building or structure.

fireresistance. That property of materials or their assemblies which prevents or retards the passage of excessive heat, hot gasses, or flames under conditions of use.

fireresistance rating. The time in hours or fractions thereof that materials or their assemblies will resist fire exposure as determined by fire tests conducted in compliance with recognized standards.

fire separation. Exterior fire exposure; the distance in feet measured from any other building on the site, or from an interior lot line, or from the opposite side of a street or other public space to the building.

fire wall. (See wall.)

flue. An enclosed passageway used for the removal of the products of combustion. (See chimney.)

garage.

—private. A garage for four (4) or less passenger motor vehicles with no provision for repairing or servicing such vehicles for profit.

—public. A building or structure for the storage, care or repair of motor vehicles not included in the term "private garage."

grade. (1) For buildings adjoining one street only, the elevation of the established curb at the center of the wall adjoining the street. (2) For buildings adjoining more than one street, the average of the elevations of the established curbs at the center of all walls adjoining streets. (3) For buildings having no wall adjoining the street, the average level of the ground adjacent to the exterior walls of the building. All walls approximately parallel to and not more than fifteen (15) feet from a street line are to be considered as adjoining the street.

grade hallway, grade lobby, grade passageway. An enclosed hallway, exitway, or corridor connecting a required exit to a street or to an open space or court communicating with a street.

habitable attic. (See attic, habitable.)

habitable room. A room or enclosed floor space arranged for living, eating, and sleeping purposes (not including bathrooms, water closet compartments, laundries, pantries, foyers, hallways and other accessory floor spaces).

hallways, grade. (See grade hallway.)

hallway, public. (See public hallway.)

height of building. The vertical distance from the grade to the top of the highest roof beams of a flat roof, or to the mean level of the highest gable or slope of a hip roof. When a building faces on more than one street, the height shall be measured from the average of the grades at the center of each street front.

hotel. (See dwelling.)

interior lot line. Any lot line other than one adjoining a street or public space.

lodging house. (See boarding house.)

lot line. A line dividing one lot from another, or from a street or public space.

minimum habitable room height. A clear height from finished floor to finished ceiling of not less than seven and one-half (7½) feet in basement and upper stories and not less than seven and one-third (7⅓) feet for attic rooms and top half-stories over not less than one-third (⅓) the floor area when used for sleeping, study or similar activity.

minimum habitable room size. A room with a minimum dimension of seven (7) feet and a minimum area of seventy (70) square feet between enclosing walls or partitions, exclusive of closet and storage spaces.

motor fuel service station. A structure, building, or premise or any portion thereof where a flammable fluid is stored, housed, or sold for supply to motor vehicles.

motor vehicle repair shop. A building, structure or enclosure in which the general business of repairing motor vehicles is conducted including a public garage.

multi-family dwelling. Apartment house. (See dwelling.)

noncombustible. Incombustible; a general relative term; its precise meaning is defined in the Basic Building Code for specific applications.

noncombustible material. (Check Test.) Any material which will neither ignite nor support combustion in air at a temperature of twelve hundred (1200) degrees F., six hundred and fifty (650) degrees C., during an exposure of five (5) minutes in a vented tube or a vented crucible furnace.

occupancy load. The number of individuals normally occupying the building or part thereof, or for which the exit facilities have been designed.

occupiable room. A room or enclosed space designed for human occupancy in which large numbers of persons congregate for amusement, educational or similar purposes, or in which persons are engaged at labor, and which is provided with exits, light and ventilation meeting the requirements of the Basic Building Code and the Abridged Building Code.

parking deck. (See public parking deck.)

party wall. (See wall.)

penthouse. An enclosed structure above the roof of a building, other than a roof structure, extending not more than twelve (12) feet above the roof, and occupying not more than thirty-three and one-third (33⅓) per cent of the roof area.

petroleum bulk storage. A building or structure for the storage of lubricating oils with a flash point of three hundred (300) degrees F. or higher and storage space for not more than one motor vehicle.

place of assembly. A room or space accommodating one hundred (100) or more individuals for religious, recreational, educational, political, social and amusement purposes or for the consumption of food and drink, including all connected rooms or space with a common means of entrance and exit.

place of outdoor assembly. Premises used or intended to be used for public gatherings of two hundred (200) or more individuals in other than buildings.

public corridor. An enclosed public passageway with access to and from individual apartments, offices or rooms leading to a public hallway or to the exitways.

public hallway. A public corridor or space separately enclosed or providing common access to all the exitways of a building in any story.

public parking deck. An unenclosed or partially enclosed structure for the parking of motor vehicles, with no provision for the repairing or servicing of such vehicles.

public space. A plot or area of land outside of the building dedicated or devoted to public use by legal mapping or any other lawful procedure.

repair. The replacement of existing work with equivalent materials for the purpose of its maintenance, but not including additional work that would affect safety, or affect required exit facilities, or a vital element of an elevator, plumbing, gas piping, wiring, ventilating or heating installation, or any work that would be in violation of a provision of this code or any other law governing building construction.

roof covering. The covering applied to the roof for weather resistance, fire resistance or appearance.

roof structure. A structure above the roof of any part of a building enclosing a stairway, tank, elevator machinery or ventilating apparatus, or such part of a shaft as extends above the roof.

slow burning. This is a general relative term. Its precise meaning is defined in this code for specific applications.

standard fire test. The standard controlled furnace test formulated under the procedure of the American Society for Testing Materials and designated ASTM E119 as listed in appendix B.

story. That part of a building comprised between a floor and the floor or roof next above. (See also mezzanine.)

street. A primary thoroughfare or highway of thirty (30) feet or more in width as dedicated or devoted to public use by legal mapping, use or other lawful means.

street lot line. The lot line dividing a lot from a street or other public space.

structure. An assembly of materials forming a construction for occupancy or use including among others, buildings, stadiums, gospel and circus tents, reviewing stands, platforms, stagings, observation towers, radio towers, water tanks, trestles, piers, wharves, open sheds, coal bins, shelters, fences and display signs.

tourist home. (See boarding house.)

use group. The classification of a building or structure based on the purpose for which the building or structure is designed or used.

wall.

—fire wall. A wall having adequate fireresistance and structural stability under fire conditions to accomplish the purpose of completely subdividing a building or of completely separating adjoining buildings to resist the spread of fire.

—party wall. A wall on an interior lot line used or adapted for joint service between two buildings.

writing. The term shall be construed to include handwriting, typewriting, printing, photo-offset or any other form of reproduction in legible symbols or characters.

written notice. A notification in writing delivered in person to the individual or to the parties intended or delivered at or sent by registered mail to the last business address known to the party giving the notice.

yard. An unoccupied space on the same lot with a building extending along the entire length of a street, or rear, or interior lot line.

zoning. The reservation of certain specified areas within a community or city for buildings and structures, or use of land, for certain purposes with other limitations such as height, lot coverage and other stipulated requirements.

SECTION 102.0. CLASSIFICATION BY USE GROUPS

For the purpose of this code, all buildings and structures shall be classified in one of the use groups herein defined; high hazard, business, assembly, institutional, and residential use groups. (See article 2 and table 6, Basic Building Code.)

102.1. High Hazard Use Group.—All buildings and structures or parts thereof shall be classified in the high hazard use group which are used for the storage, manufacture or processing of highly combustible or explosive products or materials which are likely to burn with extreme rapidity or which may produce poisonous fumes or explosions; for storage or manufacturing which involves highly corrosive, toxic or noxious alkalies, acids or other liquids or chemicals involving flame, fume, poisonous, irritant or explosive gases; and for the storage or processing of any materials involving explosive mixtures of dust or which result in the division of matter into fine particles subject to spontaneous ignition.

102.2. Business Use Group.—All buildings and structures or parts thereof that are designed or used for the transaction of business, or for the manufacture, fabrication, assembling, processing or storage, or for the sale of goods, wares, and merchandise, not including those that involve highly combustible, flammable or explosive products or materials of the high hazard use group shall be classified in the business use group, including motor vehicle service stations and similar establishments.

102.3. Assembly Use Group.—All buildings and structures or parts thereof which are designed or which are primarily used for public assembly for the purpose of amusement, entertainment, recreation, education or religion shall be classified in the assembly use group.

102.4. Institutional Use Group.—All buildings and structures or parts thereof which are used for harboring people for penal, correctional, medical or other care or treatment shall be classified in the institutional use group.

102.5. Residential Use Group.—All buildings and structures or parts thereof which are designed for, or in which families or households live, or in which sleeping accommodations are provided with or without dining facilities, excluding those that are defined as institutional buildings, shall be classified in the residential use group.

SECTION 103.0. CLASSIFICATION BY CONSTRUCTION TYPES

For the purpose of this code, all buildings and structures erected or to be erected, altered or extended in height or area shall be classified with respect to construction as one of the following construction types: fireproof, noncombustible, exterior masonry wall, and frame type. (See article 2 and table 5, Basic Building Code.) It shall be unlawful to post, use, designate or advertise a building as of a specified type of construction unless it complies with all the minimum requirements of this code for that type.

103.1. Fireproof Construction Type.—All fireproof (types 1-A and 1-B) buildings shall be constructed with enclosure walls of masonry, reinforced concrete or other approved noncombustible materials with a fire-resistance rating as required in table 5 of the Basic Building Code; and with interior walls, floors, roofs, permanent partitions, exitways and structural elements designed and protected with noncombustible materials to afford the specified fire-resistance ratings of table 5 of the BBC; except that the fire-resistance rating may be waived where unprotected steel is permitted under the provisions of section 103.6.

103.2. Noncombustible Construction Type.—All noncombustible buildings (types 2-A, 2-B and 2-C) shall be constructed entirely of steel, concrete or other approved noncombustible materials with the minimum fire-resistance ratings of the enclosure walls specified in table 2, section 107.4 of this code when erected within the fire limits; and exitways shall be constructed with a fire-resistance rating of not less than three-quarter (¾) hour in other than one- and two-family dwellings. Noncombustible type construction may be protected with noncombustible materials to afford fire-resistance ratings of three-quarter (¾) and one and one-half (1½) hours as regulated by table 5, Basic Building Code.

103.3. Exterior Masonry Wall Construction Type.—All masonry wall type buildings shall be constructed with exterior, fire and party walls of approved masonry complying with sections 112 and 119 or of other approved noncombustible materials with a fire-resistance rating of not less than two (2) hours, with roofs, floors and interior framing wholly or partly of wood or other approved materials of similar combustible characteristics complying with section 111, or of heavy timber mill-type construction and exitways constructed and enclosed as required in section 108; except that girders and their supports carrying walls of masonry shall in all cases be protected to afford the required fire-resistance rating of the walls supported thereon. The interior framing of exterior masonry wall buildings may be protected to afford a fire-resistance rating of three-quarter (¾) hour.

103.4. Frame Construction Type.—All frame type buildings shall be constructed with walls, partitions, floors and roofs wholly or partly of wood stud and joist assemblies complying with section 111, or of other approved materials of similar combustible characteristics; and with approved firestopping at all vertical and horizontal draft openings as specified in section 119.9. The enclosure walls, interior framing and partitions may be protected to furnish one-half (½) hour fire resistance.

103.5. Height and Area Limitations.—Except as herein specifically provided, all buildings shall be constructed and protected to develop the fire-resistance ratings specified in table 5 of the Basic Building Code (see appendix E); and the areas and heights of all buildings and structures between exterior walls or between exterior walls and fire walls shall not exceed the limitations fixed in table 6 of the Basic Building Code for one-story buildings (see appendix E), subject to the fire limit restrictions provided in section 107.2.

103.51. Multistory Buildings.—In buildings over one (1) story in height, the area limits of table 6 for one-story buildings shall be reduced for each story of height over one (1) story in all use groups as herein specified:

1½-hour protected noncombustible construction (type 2-A)	1/20
¾-hour protected construction (types 2-B, 3-A and 3-B)	1/10
Unprotected construction (types 2-C and 3-C)	1/6
Frame Construction (types 4-A and 4-B)	1/4

103.6. Exceptions to Fire-Resistive Requirements.—In fire-resistive construction, the fire-protective covering may be omitted from roof trusses, girders, beams and purlins when every part of the structural framework is twenty (20) feet or more above the floor immediately below; and the roof slabs or other construction between purlins shall be entirely of noncombustible materials of the required strength or of mill-type construction; or may be constructed of approved roof deck materials which are equal in strength and fire resistance to mill-type construction.

SECTION 104.0. ADMINISTRATION AND ENFORCEMENT

The building official is invested with the authority and responsibility to enforce all laws controlling safe building construction. In the smaller community, this duty is frequently delegated to a committee of the town council or selectmen which should consist of not less than three members who should appoint a qualified building official to carry out the details of inspection and enforcement of regulations and orders.

If compliance with the building official's orders does not ensue, the customary procedure is to report the facts to the municipal law officer to take the appropriate legal action. If work is being done, or existing conditions are such as to constitute danger to the occupants or the public, the building official must have the authority to take immediate steps for removal of the unsafe conditions without court action.

While the building department acts in the interest of the entire community to insure structural, fire and health safety, it serves also in an advisory capacity and renders special services to the man who builds. With the usual small municipal budgets, it is often impossible to operate without fees for permits, inspections and other services rendered.

Exacting fees for inspections and imposing penalties for violations will create a fund that might well be utilized to finance the operations of the building department. Where the local laws do not require all money receipts to be placed in general municipal funds, a building code fund might be established to be used exclusively under the direction of the local council or the committee of selectmen for the administration of the building code. The building inspection departments of many municipalities are now operated on a self-sustaining basis.

In progressive communities, it is also recommended that a planning board of qualified civic-minded citizens be formed to act in an advisory capacity. The planning board can render valuable services in consultation with the municipal authorities in directing the growth of the community and recommending solutions of unusual problems involved in building construction.

104.1. Administrative Authority.

104.11. Building Official.—When not otherwise provided for by the municipal charter, the governing body of the municipality shall appoint a building official to whom shall be delegated the duty to administer the building laws. The building official shall be authorized and directed to enforce all the provisions of this code, and shall have the authority to enter any building or premises within the municipality for the purpose of inspection or for the prevention of violations of the provisions of this code. The building official shall be generally informed on good engineering practice in respect to the design and construction of buildings, the basic principles of fire prevention, requirements for means of egress and the installation of plumbing and other service equipment necessary for the health, safety and general welfare of the public. He shall make all inspections within twenty-four (24) hours after call or other notice from the owner or his representative or within such reasonable time as the circumstances permit.

104.12. Relief from Personal Responsibility.—The building official, officer or employee charged with the enforcement of this code shall not be personally liable while acting for the municipality, and he is hereby relieved from all personal liability for any damage that may accrue to persons or property as a result of any act required or permitted in the discharge of his official duties.

104.2. Application for Permit.—No building or structure or part thereof shall hereafter be erected, converted, repaired, altered or enlarged until a building permit has been obtained by the owner or his agent. The application for a permit shall be made in writing on approved forms; and shall be accompanied by two (2) complete sets of dimensioned plans showing all habitable floors, basement, cellar, foundations and sections, and by specifications describing the kind, size, quality and grade of all construction materials and service equipment. The building official may waive the requirement for filing plans when the work involved is of a minor nature and the building operation is adequately described in the application. All plans submitted for filing shall be prepared and signed as required by the statutes of the State of (name of state). Where compliance with state statutes governing building construction is required, the application shall be accompanied by a set of the plans approved by the designated authority.

104.21. Service Connections.—Before a building can be demolished or removed, the owner or agent shall notify all utilities having service connections within the building, such as water, electric, gas, sewer and other connections. A permit to demolish or to remove a building shall not be issued until a release is obtained from the utilities, stating that their respective service connections and appurtenant equipment, such as meters and regulators, have been removed or sealed and plugged in a safe manner.

104.22. Plot Diagram.—There shall also be filed with each application a description of the premises and a dimensioned plot diagram showing to scale the size and location of all new construction and all existing structures on the site, distances from lot lines, established street grades and existing sewers, gas, water and other public utilities in the street. In the case of demolition, the plot diagram shall show all construction to be demolished and all construction that is to remain on the site.

104.3. Approved Plans.—One copy of the approved plans and specifications together with a signed permit shall be kept at the site of the operation during all times that work is in progress and until the completion of the building. After issuance of a building permit, the approved plans and specifications shall not be altered unless any proposed change is first approved by the building official as conforming to the provisions of this code. A building permit shall become void unless operations are commenced within six (6) months from date of approval, unless such time is extended by the building official. One set of the approved plans of every building or structure other than temporary structures shall be kept on file in the office of the building official as a permanent official record.

104.4. Stop-Work Order.—Whenever the provisions of this code or of the plans and specifications approved thereunder are not complied with, a stop-work order shall be served on the owner or his representative and a copy thereof may be posted at the site of the construction. Such stop-work order shall not be removed except by written notice of the building official after satisfactory evidence has been supplied that the violation has been corrected.

104.5. Violations.—It shall be unlawful for any person to erect, use, occupy or maintain any building or structure in violation of any provision of this code or to cause, permit or suffer any such violation to be committed. Any such person shall be deemed guilty of a misdemeanor and upon conviction shall be punished by a fine of ——— dollars or by imprisonment for not more than —— days, or by both such fine and imprisonment for each provision of law thus violated. It shall be the responsibility of the offender to abate the violation as expeditiously as possible, and each day that such violation is permitted to continue shall constitute a separate offense.

104.6. Fees.—Before receiving a building permit, the owner or his agent shall pay the fees specified in table 1. In applying the provisions of this code in respect to new work, existing buildings, alterations and repairs, the physical value of the work shall be determined by the building official on the basis of current costs and as provided in section 106.5, or as otherwise provided in the local ordinances.

TABLE 1.—SCHEDULE OF PERMIT FEES

Valuation of work	Fee	Suggested fee
Under $50	——	$2
$50 to $500	——	$3
$501 to $1000......	——	$4
$1001 to $10,000....	——	$4 plus $2 for each additional thousand or part thereof
$10,001 and over.....	——	$22 plus $1 for each additional thousand or part thereof

104.7. Controlled Materials Procedure and Approval.—When plans for the erection or alteration of a building are prepared by a professional engineer or registered architect, licensed under the laws of the State of [*name of state*], and such plans and specifications are accompanied by an affidavit of the applicant that he has supervised the preparation of all the design plans and that he will supervise or check all working drawings and shop details for the construction; and that the structure will be built under his field supervision and in accordance with the approved plans, and that such plans conform to all the provisions of this code and the

Basic Building Code, and that all the materials used in the construction will be selected or identified as to stress grade and quality in accordance with the controlled materials procedure, the building official may issue a permit for the erection of the building. The building official shall make such inspections during the progress of the work and shall issue such orders as he may deem essential to secure compliance with the building code.

Before such building or structure is permitted to be used or occupied, the licensed professional engineer or registered architect who prepared and filed the original plans and who supervised the erection of the building shall file an affidavit stating under oath that the provisions of this code have been fully complied with and that the building meets all the requirements of law for the proposed use and occupancy. (See sections 129 and 722 of the Basic Building Code.)

104.8. Special Technical Services.—When applications for unusual technical design or magnitude of construction are filed, the building official may refer such plans and specifications to the Structural Bureau of the Building Officials Conference for analysis and recommendation as to safety of design and compliance with this code; or the building official may retain a properly qualified licensed engineer or registered architect to examine the application for a specific building operation with respect to safety and compliance with this code and all other statutory requirements.

104.9. Coordinated Inspection.—All provisions of the laws and regulations of the State [*name of state*], and of legally adopted rules of local fire, health and labor officials in respect to the operation, equipment, housekeeping, fire protection, handling and storage of flammable materials, liquids and gases and the maintenance of safe and sanitary conditions of use and occupancy in all buildings shall be strictly enforced by the administrative officials to whom such authority is delegated. Whenever inspection by any authorized enforcement officer discloses any violation of the provisions of this code or of any other rules, regulations or laws, he shall immediately notify the administrative officer having jurisdiction of the violation. (See sections 104 and 404 of the Basic Building Code.)

SECTION 105.0. ALTERNATE CONSTRUCTIONS

105.1. New Materials and Methods.—All new materials, methods of construction, devices and equipment shall be approved by the building official for use in buildings by the procedure herein provided when they are proved to be the equal of those specifically required by this code: or he may adopt the recommendations and approvals of the Building Officials Conference in respect thereto.

105.2. Tests.—Unless based on accepted engineering design, all new building materials, appliances, equipment, systems or methods of construction not provided for in this code shall be subjected to tests that simulate the actual conditions which occur in normal use. Such tests shall be made at the expense of the applicant at an accredited laboratory and copies of the test results shall be kept on file in the office of the building official. (See sections 109, 803, 804 and 805 of the Basic Building Code.)

The building official shall accept duly authenticated reports from recognized authoritative sources in respect to the use of any new materials, methods or systems of construction complying with the applicable specifications and standards of accepted engineering practice as listed in appendixes A and B insofar as they conform to the requirements of this code.

105.3. Approvals.—Whenever any material, appliance or method of construction shall have been approved for use under this code, a record of such approval and the conditions and limitations of its approval shall be kept on file in the office of the building official and shall be open to public inspection during business hours.

105.4. Prefabrication.—Prefabricated assemblies not capable of design by accepted engineering analysis shall be subjected to the same tests required for at-site construction. When prefabricated assemblies are not readily accessible for inspection at the site, the licensed engineer or architect or other authorized and approved representative of the manufacturer shall furnish a verified report of inspection. All tests and inspection records shall be accessible to the building official at all times during fabrication and erection of the building or assembly unit, or such records as he may designate shall be filed with him. (See article 19, Basic Building Code.)

105.5. Identification of Product.—All new materials and prefabricated assemblies approved for use under this code shall be identified by the approved label, the grade mark, the trademark or by other approved manufacturer's identification. A drawing of the official identification mark shall be kept on file in the office of the building official.

SECTION 106.0. EXISTING BUILDINGS

106.1. Existing Use Unchanged.—The legal use and occupancy of any building or structure existing on [*date of adoption of this code*], or for which it had been heretofore approved, may be continued without change when such use is not detrimental to the general safety and welfare of the public, provided the building is not enlarged in height or area and the exit facilities are adequate for a new building of the same use and occupancy load. (See sections 106, 306, 406, 506, 606, 706, 1006, 1106, 1206, 1306, 1406, 1506, 1606, 1706, 1806, and 1906 of the Basic Building Code.)

106.2. Change in Use.—If the use or occupancy of an existing building is changed to a use or occupancy which would be prohibited in a new building hereafter erected of similar construction and size, the entire building shall be made to conform to the requirements of this code for such new building; except that if the use or occupancy of only a portion or portions of an existing building is changed and such portion or portions are segregated by fire divisions as provided in section 119.2, then only such portions shall be made to comply with all the requirements of this code; or the building official may accept substitute solutions which insure an equal degree of safety.

106.3. Alterations and Repairs.—When an existing building is damaged by fire or other cause or if alterations and repairs are made to an extent of fifty (50) per cent or more of the physical value of the building before such damage or alteration, the entire building or structure shall be made to comply with the requirements of this code for new buildings. If the cost of such alterations or repairs is less than fifty (50) per cent of the physical value of the building, the building official shall determine to what degree the portions so altered or repaired shall be made to conform to the requirements of this code except as provided for roofing in section 106.4.

106.4. Roofing Repairs.—The replacement of more than twenty-five (25) per cent of the roof covering of an existing building or structure in any one period of twelve (12) months with the same materials of which it is constructed shall be prohibited unless the entire roofing is made to comply with the requirements of section 119 for new roofing.

106.5. Determination of Physical Value.—In applying the provisions of section 106, the physical value of the building shall be based on the estimated current replacement cost of the complete structure.

106.6. Nuisance Abatement Order.—Whenever an existing building is damaged to an extent of fifty (50) per cent or more of the replacement value, and the damage is not repaired or the nuisance is not abated, the building official shall serve a written order on the owner to abate the nuisance or demolish the building within thirty (30) days of the receipt of such notice. Each day that the damaged structure shall be permitted to stand after the expiration of the thirty (30) day period shall constitute a separate violation of this code subject to the penalties provided in section 104. If the owner fails to abate or remove the nuisance within sixty (60) days after service of the notice, the municipality shall employ the necessary labor and materials to perform emergency repairs or to demolish the damaged building or structure as may be deemed necessary for the general public health and safety; and the legal authority of the municipality shall institute the appropriate action against the owner of the premises for recovery of the costs; and such costs shall become a lien against the premises until the claim is satisfied. (See sections 123, 124, 125 and 126 of the Basic Building Code.)

106.7. Unsafe Buildings.—The building official shall condemn all unsafe buildings and shall order such buildings to be taken down, removed, or made safe and secure as he may deem necessary or as provided in this code. All buildings that are or hereafter shall become unsafe structurally, unsanitary, or deficient in exit facilities, or which constitute a fire hazard, or which are otherwise dangerous to human life or the public welfare by reason of illegal or improper use, occupancy or maintenance shall be deemed unsafe buildings or structures. A vacant building with unguarded opening shall be deemed to constitute a fire hazard and to be unsafe within the provisions of this code.

106.8. Notice of Unsafe Buildings.—When an unsafe condition is found in a building or structure, the building official shall serve a written notice on the owner or his agent specifying the repairs or improvements required to render the building or structure safe and secure, or to demolish the structure or part thereof within a stipulated time.

106.9. Emergency Safeguards.—When there is actual and immediate danger of failure or collapse, or when any structure or part thereof has fallen and life is endangered by the occupation of the building, the building official shall be empowered to order and require that such building or structure be vacated forthwith. He shall cause the necessary work to be done as expeditiously as possible to render such building or structure or part thereof temporarily safe; and when necessary for the public safety, he may temporarily close sidewalks, streets and adjacent buildings. All costs of emergency work shall be paid out of the municipal treasury and the legal authority shall institute the necessary court action for the recovery of the costs involved in such work from the owner of the premises as provided in section 106.6.

SECTION 107.0. FIRE DISTRICTS

107.1. Fire District Subdivision.—To control types of construction based on the inherent fire hazard of use groups of buildings, the municipal authority shall establish fire district limits to include all areas in which congested business, commercial and public assembly uses are housed. Such areas shall be designated as "within the fire limits" and shall be bounded and described as beginning at ——— to the point or place of beginning. (See section 301, Basic Building Code.)

107.2. Construction Within the Fire Limits.—All other areas not included "within the fire limits" shall be designated as "outside the fire limits." No building of frame construction shall be erected within or moved from outside to within the fire limits except as provided in this section, and no building of otherwise lawful construction shall be extended in height or area by frame construction within the fire limits, except that one- or two-family dwellings may be extended by not more than two hundred (200) square feet in area and to a height of not more than two and one-half (2½) stories nor more than thirty-five (35) feet. Roof coverings shall comply with section 119.5.

107.21. Temporary structures, reviewing stands, construction sheds, shanties, canopies and similar temporary structures may be erected of frame construction for a limited period of time as approved by the building official.

107.22. Fences of frame construction may be erected to a height of not more than six (6) feet.

107.23. Verandas, balconies and entrance porticoes and similar appurtenant structures of frame construction may be erected on dwellings, when not more than ten (10) feet in width and projecting not more than two (2) feet above the second-story floor beams, provided they do not extend nearer than five (5) feet to the lot line.

107.24. Storm enclosures may be erected of frame construction not more than ten (10) feet in height and not more than three (3) feet wider than the entrance doors which they serve; provided they do not project more than six (6) feet beyond the building line.

107.25. Accessory Buildings.—Outbuildings and parking lot offices not more than ten (10) feet in height and one hundred (100) square feet in area, and greenhouses, may be erected of frame construction when accessory to a dwelling on the same lot or accessory to a lot approved for motor vehicle parking and located not less than six (6) feet from the lot line or from any other building.

Private garages not more than one (1) story or fifteen (15) feet in height when accessory to and located on a lot with a dwelling may be erected of protected frame (type 4-A) construction not more than seven hundred and fifty (750) square feet in area or of frame (type 4-B) construction not more than five hundred (500) square feet in area, when located not less than six (6) feet from interior lot lines or any building.

Boathouses not over two (2) stories or thirty (30) feet in height, nor more than one thousand (1000) square feet in area may be erected of frame construction.

Sheds open on the long side not over fifteen (15) feet in height nor more than five hundred (500) square feet in area may be erected of frame construction when located not less than six (6) feet from the lot line.

107.26. Exterior Trim.—Wood cornices and half-timbering may be erected on dwellings and business buildings; and existing openings in exterior walls of masonry enclosed buildings which are not required for ventilation or access purposes may be filled in with wood studs, metal lath and stucco or other approved construction of equal fire resistance.

107.27. Roof Structures.—Aerial supports, clothes dryers and similar structures less than twelve (12) feet in height, water tanks and flag poles may be erected of wood or other approved materials; and drip bars in cooling towers may be constructed of wood not less than one (1) inch thick.

107.28. Motor Fuel Service Stations.—Gasoline service stations and structures of similar business uses, not including high hazard uses, may be erected of unprotected noncombustible construction within the height and area limits of use group E of table 6, Basic Building Code (see appendix E), provided they are located more than eleven (11) feet from the lot line, or the exterior walls are protected against exterior fire exposure as required in table 2, section 107.4.

107.29. High Hazard Uses.—All buildings and structures of high hazard uses shall be prohibited within the fire limits; except that dry-cleaning plants and buildings of similar use groups in which less than three (3) gallons of flammable liquids with a flash point under eighty (80) degrees F., are stored in approved containers, or less than sixty (60) gallons of flammable liquids with a flash point between eighty (80) and one hundred and forty (140) degrees F., or using other than volatile flammable solvents in cleaning and dyeing operations, may be erected within the fire limits not more than one (1) story in height of protected exterior masonry construction (type 3-B) or better; but no such use shall be located in a basement of any building or in any part of a public assembly building. Paint spray, drying rooms and rooms for similar incidental uses not exceeding one thousand (1000) square feet in area shall be permitted in industrial buildings when enclosed in not less than two (2) hour fire-resistive construction. All buildings of high hazard uses when permitted within the fire limits shall be enclosed with walls of not less than two (2) hour fire-resistance rating when located within eleven (11) feet of interior lot lines or any building on the same lot.

107.3. Construction Outside the Fire Limits.—Outside the fire limits, all types of construction shall be permitted except as herein specifically prohibited or for which special approval and permit are required in connection with high hazard uses and occupancies. (See article 4, Basic Building

Code.) The exterior walls of all frame buildings which are erected less than six (6) feet from interior lot lines shall be constructed and protected to afford a fire-resistance rating of not less than three-quarter (¾) hour, including window and door openings, except for store fronts and window and door openings in one- and two-family dwellings; but in no case shall frame walls be located less than three (3) feet from the lot line. Roof coverings shall comply with section 119.6.

107.4. Lot Line Separations and Fire Exposure.—Within the fire limits, the distance between exterior walls and the nearest lot line other than street lot lines, as herein defined, or from any other building, shall conform to the requirements of table 5 of the Basic Building Code but in no case less than prescribed in table 2; except that two-hour enclosures shall be required for high hazard uses as provided in section 107.29 and as otherwise provided for special uses and occupancies. (See article 4, Basic Building Code.)

TABLE 2.—LOT LINE SEPARATIONS WITHIN FIRE LIMITS

Distance from lot line	Fire resistance of exterior walls to outside exposure*
Under 11 feet with ¾-hour opening protectives where permitted.......	¾ hour
11 feet and over with unprotected openings.......................	Noncombustible

*See appendix C for fire-resistance ratings of the common materials of construction.

107.5. Unlimited Areas.—Outside the fire limits, the areas of buildings of other than frame construction designed for business uses not including high hazard uses, not more than one (1) story nor more than eighty-five (85) feet in height, shall not be limited by the provisions of table 6, Basic Building Code, under the following conditions: exitways complying with section 108 of this code are provided to accommodate the entire occupancy load on each front of the building; the building is equipped with an approved one-source automatic sprinkler system; and the structure is isolated on all sides by streets or other open spaces with the following minimum fire separations:

Buildings of fireproof construction....................................	30 feet
Buildings of protected noncombustible construction (1½ hours)........	30 feet
Buildings of protected noncombustible construction (¾ hour)..........	40 feet
Buildings of exterior masonry (heavy timber and protected ordinary)..	40 feet
Buildings of exterior masonry (ordinary).............................	50 feet
Buildings of noncombustible construction (unprotected exterior)........	50 feet

107.6. Garages and Service Stations.

107.61. Public Garages.—All buildings, structures and enclosures designed or used as public garages as defined in this code shall be limited to two (2) stories in height when of unprotected noncombustible (type 2-C) construction or ordinary (type 3-C) construction. Such heights may be increased by one (1) additional story when the building is equipped with an approved sprinkler system. The first floor construction of public garages with basements shall be constructed waterproof and vaporproof to provide not less than two (2) hours' fire resistance. No pits shall be installed in floors below the first or grade floor; and pits in the first and upper stories shall be ventilated to insure four (4) air changes per hour. Basement and cellar garages shall be equipped with mechanical ventilation to provide not less than six (6) air changes per hour.

107.62. Motor Fuel Service Stations.—All buildings designed or used as motor vehicle or gasoline service stations shall be subject to the height and area limitations of table 6 of the Basic Building Code for business buildings (use group E). All permissible openings with a fire exposure of less than twenty (20) feet shall be provided with approved fire windows or fire doors complying with section 119.

107.63. Motor Vehicle Repair Shops.—All buildings and structures or parts thereof designed or used as motor vehicle repair shops shall be subject to the height and area limitations for moderate hazard storage buildings (use group B-1) and shall be used solely for that purpose. Exterior walls located within six (6) feet of interior lot lines or other buildings on the same lot shall be constructed without openings.

107.64. Public Parking Decks.—Public parking decks may be erected without enclosure walls except that an enclosure wall with not less than two (2) hours fireresistance, without openings therein, shall be provided when located within six (6) feet of interior lot lines. When of fireproof (types 1-A and 1-B) construction, the height and area shall not be limited; when of one and one-half (1½) hour protected noncombustible (type 2-A) construction, the structure shall not exceed seven (7) tiers in height above grade nor thirty thousand (30,000) square feet in area; when of three-quarter (¾) hour protected noncombustible (type 2-B) construction, the structure shall not exceed five (5) tiers in height above grade nor twenty-two thousand (22,000) square feet in area; and when of unprotected noncombustible (type 2-C) construction, the structure shall not exceed three (3) tiers in height above grade nor fifteen thousand (15,000) square feet in area; except further that when the primary members of the noncombustible structural frame are fabricated of hot-rolled structural steel, all type 2 public parking decks may be thirty-thousand (30,000) square feet in area and the height limits specified for type 2-C construction may be increased to four (4) tiers above grade. Continuous wheel guards and protective guard rails shall be provided to comply with the Basic Building Code around the outside perimeter of the structure on all tiers.

107.65. Petroleum Bulk Storage Buildings.—Warehouses for the bulk storage of not more than fifty thousand (50,000) gallons of lubricating oils with a flash point of not less than three hundred (300) degrees F. in approved sealed containers may be erected one (1) story in height and not more than five thousand (5000) square feet in area of exterior masonry wall (type 3-C) construction outside the fire limits and of proportionate areas for higher types of construction. Not more than one motor vehicle shall be stored in such buildings unless separately enclosed with a fire division of not less than two (2) hours' fire resistance.

107.7. Attached Garages.—All garages located beneath or attached to one- or two-family dwellings shall have floors, walls, partitions and ceilings constructed of not less than three-quarter (¾) hour fireresistance, including exitway through such garages, with a three-quarter (¾) hour fire door or a one-and-three-quarter (1¾) inch solid core, flush type wood door or the approved labelled equivalent at the garage floor and a sill height of not less than eight (8) inches. When such garages are separated from the dwelling spaces by an open breezeway, not less than ten (10) feet in length, the garage may be of frame construction outside the fire limits. The junction of garage wall and breezeway roof shall be firestopped to comply with section 119.9. In the case of pitched roofs, the attic space shall be cut off with a partition of not less than one-half (½) hour fireresistance from such breezeway. Garages not exceeding one thousand (1000) square feet in area located beneath multi-family dwellings or motels and in which no gasoline or oil is stored or handled shall be of not less than one and one-half (1½) hour protected construction; all other garages located under a building shall be of not less than one and one-half (1½) hour fire protected non-combustible construction.

107.8. Special Storage Spaces.—No building or any part of the lot upon which it is located shall be used for the storage or handling of any material or product which is highly combustible, noxious or otherwise dangerous to life or health without a special permit from the building official. The permit shall specify the conditions under which such use may be conducted and maintained.

107.9. Noncombustible Construction Exemption.—In all use groups except high hazard, assembly and institutional uses, one-story buildings of noncombustible (type 2-C) construction which are not more than three thousand (3000) square feet in area shall be exempt from the requirement for fire resistance of exterior walls both within and outside the fire limits.

SECTION 108.0. EXIT REQUIREMENTS

Every building and structure and part thereof hereafter erected shall have adequate exitways providing safe and continuous means of egress to a street, or to an open space with direct access to a street as herein provided. The owner or lessee of every existing building and structure shall be responsible for the safety of all persons in or occupying such premises with respect to the maintenance and adequacy of means of egress therefrom. (See section 606, Basic Building Code.)

Note: Safe Means of Egress.—Protection of life from fire is the greatest hazard to be overcome in the design of safe buildings. In the solution of this problem, either the building must be so constructed as to provide a safe area of refuge to which the occupants can escape, or adequate exit facilities must be provided to vacate the structure in times of emergency in not more than twenty (20) minutes and preferably within five (5) to ten (10) minutes.

While it might appear that the smaller buildings covered by the provisions of the ABC would offer ready solution, it is significant to note that three-quarters of the total annual toll of human life from fire is accounted for in buildings of dwelling occupancy and largely in small homes, mainly owing to the preponderance of such structures. Basements are now becoming recreation centers involving many of the hazardous attributes common to night club activities. It was originally proposed to require special fire-resistive construction for the ceilings of play rooms below grade, or a direct secondary means of egress therefrom. This provision raised considerable opposition and was eventually waived in its application to one- and two-family dwellings.

The number and kind of required exits from a building are determined by the fire hazard inherent in the habitational use and occupancy, the fire resistance of the type of construction, the flame resistance of trim and finish materials, and the layout of the building. The provision of a safe area of refuge, and the number of required secondary means of egress, depend also upon the physical arrangement and individual characteristics of each building.

Existing substandard buildings which are not now equipped with safe exitways and auxiliary fire-protective features are a problem of urgent importance. The full requirements applicable to buildings hereafter erected are not always practical and frequently are economically prohibitive in such existing buildings.

The specific structural items and fire-protective features that are generally practical in existing buildings include: enclosure of interior stairways and exitways; enclosure of vertical shafts independent of stairways; limitation of required travel distance through unprotected corridors to one hundred (100) feet in non-fire-resistive buildings and to one hundred and fifty (150) feet in sprinklered and fire-resistive buildings; segregation of areas of high hazard use or protection with sprinklers or other automatic means of extinguishment; provision of means for transmitting alarms to the fire-fighting forces at the inception of the fire; and watchmen's services and fire brigades or fire patrols trained in the use of emergency fire-fighting equipment, particularly where large occupancies are involved. In structures of limited height, fire escapes and other emergency devices are available that provide some degree of safety.

Structural protective elements that afford the required one-half (½) to three-quarter (¾) hour fire resistance are available which do not meet the ordinarily prescribed one (1) hour fire test that has been heretofore established as the minimum standard of fire resistance. A table of such assemblies will be found in appendix C of the ABC.

It is difficult to set up general principles to take care of all contingencies. The Basic Building Code provides fundamental rules for complete coverage of the whole range of uses and occupancies of buildings and structures; for means of fire venting to minimize the spread of fire and release smoke, gases and hot air in article 5; for safe exitways in article 6; for minimum fire-resistive requirements of structural elements and fire barriers in article 9; and for stand-by manual and automatic fire extinguishing and detecting equipment in article 12. Safeguards for the installation of heating equipment in articles 9 and 10, electrical wiring in article 15 and air conditioning and cooling equipment in article 18 provide the basis for eliminating major and prolific causes of fires and fire disasters in buildings.

The flame resistant properties of materials determines their resistance to burn and spread flames accompanied by the emission of smoke and toxic gases which is a source of heavy loss of life in fires. The Basic Building Code prescribes several test procedures in section 904 to govern the use of materials for trim, finish, acoustical, insulating and decorative purposes. For a complete coverage of these provisions reference is made to the restrictions contained in sections 922, 923, 924, 925 and 926 of the Basic Building Code.

108.1. One- and Two-Family Dwellings.—In one- and two-family dwellings, the exit stairway shall be not less than three (3) feet in width with continuous walls, guards or handrails projecting not more than three and one-half (3½) inches into the stair width.

108.11. Treads and Risers.—The dimensions of treads and risers shall comply with section 108.8. Winders will be permitted provided the average width of tread is not less than nine (9) inches and the minimum width is not less than four (4) inches.

108.12. Headroom.—The minimum height of doors and minimum headroom in all parts of the stairway and its enclosure shall be not less than six and two-thirds (6⅔) feet measured vertically.

108.13. Height of Rise.—No stairway shall have a height of rise of more than twelve (12) feet between landings.

108.14. Exit Doors.—All doors serving as exits shall open on a platform and the width of such doors shall be not less than two and one-half (2½) feet nominal width; except that interior doors which provide access to or egress from a dwelling unit that do not open directly on a stair enclosure shall not be construed as exit doors.

108.15. Retail Stores.—Subject to the restrictions of the zoning laws, the first floor of dwellings may be occupied for retail store use, provided the ceilings and enclosure walls are protected with three-quarter (¾) hour fire-resistive construction and the exitways from the residential areas are separately enclosed.

108.2. Multi-Family Dwellings.—In multi-family dwellings, approved exitways shall be provided and located so that the maximum length of travel to an enclosed interior stairway or fire tower is not more than seventy-five (75) feet in buildings of fireproof or protected noncombustible construction and not more than fifty (50) feet in buildings of all other types of construction. The interior primary stairway shall be not less than three (3) feet wide and may be constructed of wood or similar materials of equivalent combustible characteristics enclosed as provided in sections 108.23 and 108.82. The secondary exit shall be an additional enclosed stairway, an exterior stairway or a fire escape as herein provided.

108.21. Buildings with One Stairway.—Not more than one (1) stairway shall be required in multi-family dwellings (use group L-2) designed or used for not more than six (6) dwelling units and not more than three (3) stories and attic in height provided the building is not more than three thousand (3000) square feet in area of fireproof (type 1) or protected noncombustible (type 2-A or 2-B) construction and in other types of construction not more than two thousand four hundred (2400) square feet in area. The stairway shall be not less than three (3) feet wide, of noncombustible construction throughout, including the exit corridor and hallway, enclosed in two (2) hour fire-resistive construction with three-quarter (¾) hour self-closing fire doors or the approved equivalent at the exits thereto. The distance of travel to the exit doorway shall be not more than fifty (50) feet from any point in the habitable area.

Multi-family dwellings (use group L-2) not over two (2) stories and nonhabitable attic in height, for not more than eight (8) families, nor more than four (4) families to a floor nor more than three thousand (3000) square feet in area may be constructed with one (1) stairway. The distance of travel to the one required exit shall not exceed fifty (50) feet and the stairway shall be enclosed with partitions of not less than one and one-half (1½) hour fireresistance with three-quarter (¾) hour fire doors complying with article 9 at the openings.

108.22. Construction Limitations.—All buildings designed for multi-family dwellings more than two and one-half (2½) stories in height shall be of three-quarter (¾) hour protected frame (type 4-A) construction or better.

108.23. Secondary Exit.—Except as provided in section 108.21, a secondary exit shall be available to each dwelling unit above the first floor, consisting of an exterior stairway or a fire escape of noncombustible construction when approved by the building official, with access to the street or a second interior enclosed stairway.

108.24. Outside Fire Limits.—On residence buildings not over two (2) stories and attic in height of type 3 or type 4 construction, fire escapes may be constructed of wood members not less than two (2) inches in thickness, or other approved materials of similar combustible characteristics outside the fire limits.

108.25. Stair Enclosure.—When an approved secondary exit is provided, the partitions and ceiling enclosing the primary stairway shall be of not less than three-quarter (¾) hour fire resistance with three-quarter (¾) hour self-closing protectives at all openings except the main exit and entrance doorway. In multi-family dwellings not otherwise required to be of fireproof or protected noncombustible construction, the stairways and enclosure may be constructed of wood or other approved combustible materials protected as herein required and firestopped as specified in section 119.9.

108.26. Treads and Risers.—The dimensions of treads and risers shall comply with section 108.8. No winders shall be permitted.

108.27. Lighting.—Required interior stairways, exitways and passageways shall be provided with windows to the outer air having a glass area of not less than ten (10) square feet opening on a street, alley, yard or court or with a plain glass ventilating skylight with a metal screen below the glass. In other than one- and two-family dwellings such additional artificial lighting shall be installed to provide an intensity of three (3) foot candles at the floor level of stairways and hallways.

108.28. Basement Recreation Rooms.—In residence buildings, other than one- and two-family dwellings, the basements of which are used as play rooms or for other recreational purposes with an occupancy load of twelve (12) or more, such areas and the stairway shall be enclosed with partitions and ceilings of not less than one-half (½) hour fire-resistive construction with direct access to the main street exit. A direct secondary exit from the basement to street, yard or court leading to the street shall be accepted in lieu of the requirement for an enclosed stairway.

108.3. Business Buildings.—All business, industrial and storage buildings shall be provided with sufficient enclosed exitways so that the unobstructed travel to a street exit or to the entrance to an enclosed tunnel or other enclosed passageway leading to such exit shall not exceed one hundred

(100) feet from any point in the floor area. Where the area is subdivided into rooms or compartments, the travel distance from the entrance to such rooms or compartments shall not exceed one hundred and fifty (150) feet. When the building is equipped with an approved sprinkler system, the length of travel may be increased to one hundred and fifty (150) feet in all cases.

108.31. Number of Exitways.—The number of persons to be provided for shall be at the rate of one (1) person per unit of area as regulated in table 3. Stories above or below grade shall be served by at least one (1) interior enclosed stairway which shall be not less than three (3) feet eight (8) inches wide constructed as required in section 108.8. When only one (1) exitway is provided, the distance of travel to the exit shall not exceed seventy-five (75) feet nor shall the occupancy load be more than fifty (50). When the area exceeds four thousand (4000) square feet in buildings of fireproof (type 1) or protected noncombustible (type 2-A) construction, or more than three thousand (3000) square feet in area or more than two (2) stories in height in other types of construction, there shall be two (2) such stairways or other approved exitways. When the occupancy load in any one story is greater than three hundred (300) the exitways shall meet the requirements for assembly buildings in section 108.4.

108.32. Location of Exitways.—Whenever more than one means of exit is required from any room, space or floor, they shall be placed as remote from each other as practicable and within the allowable travel distances herein prescribed.

TABLE 3.—OCCUPANCY ALLOWANCES

Use group	Floor area in square feet per occupant
Assembly with fixed seats	6
Assembly without fixed seats	15
Business buildings	100
Court rooms	40
Dance halls, lodge rooms	15
Hotels, lodging-houses, multi-family dwellings	125
Institutional buildings	150
Mercantile buildings, first floor	30
Mercantile buildings, basement sales floor	30
Mercantile buildings, other floors	60
Schools	40
Storage buildings	300
Bowling alleys, allow 5 persons for each alley, including 15 feet of runway, and for additional areas	10

108.33. Width of Exitways.—One twenty-two (22) inch unit of exit width shall be provided for each fifty (50) persons occupying the floor area; and direct access shall be provided thereto through continuous passageways, aisles or corridors which shall be maintained free of obstruction, and shall be conveniently accessible to all occupants. Twelve (12) inches shall be considered one-half (½) unit with an allowance of twenty-five (25) persons.

108.34. Grade Floor Exits.—From the first or grade floor, direct exits shall be provided to the street consisting of one (1) unit of exit width for each one hundred (100) occupants in addition to the exits from upper and lower floor exitways.

108.35. Width of Doors.—The total width of exit doors to a stairway shall be that required for the capacity of the stairs but no single exit door shall be less than two and two-thirds (2⅔) feet wide, except that single exit doors from the first floor direct to the street may be not less than two and one-half (2½) feet wide. The maximum permissible width of exit doors shall be forty-four (44) inches. A door forty (40) inches in width shall be deemed the equivalent of two (2) full units of exit width.

108.36. Door Construction and Installation.—All required exit doors shall be approved fire doors or approved flush type solid wood doors as provided in section 119.8 with not less than three-quarter (¾) hour fire-resistance rating except for grade exit doors which shall project not more than twelve (12) inches beyond the street lot line. All exit doors shall be hung to swing in the direction of exit travel without obstructing the required width of exitway. All exit doors shall be fitted with hardware, locks and fastenings which can be readily opened from the inner side without the use of keys except as herein provided for dwellings and for assembly and institutional buildings. Draw-bolts, hooks and other similar devices shall be prohibited on all required exit doors.

108.37. Treads and Risers.—The dimensions of treads and risers shall comply with section 108.8. No winders shall be permitted except on supplementary ornamental stairways not required as a means of exit which connect not more than two (2) adjoining stories in other than industrial, assembly and institutional use groups.

108.38. Stair Construction and Enclosure.—Stair construction and enclosure shall comply with the requirements of section 108.8. Minimum headroom and maximum height of rise between platforms shall conform to the requirements for dwellings in section 108.1.

108.4. Assembly Buildings.—All assembly buildings including auditoriums without an enclosed stage and theatrical accessories, armories, bowling alleys, broadcasting studios, chapels, churches, community houses, dance halls, gymnasiums, lecture halls, museums, night clubs, rinks, roof gardens, and buildings for similar uses shall be provided with sufficient exitways so that the unobstructed travel to an approved exitway from any part of the floor area shall not exceed one hundred (100) feet in buildings of fireproof and protected noncombustible construction and seventy-five (75) feet in buildings of all other construction types.

108.41. Number of Exitways.—Every tier, floor, and story of every place of public assembly shall be provided with the number of required exitways herein specified of not less than the required width for the occupancy loads.

Occupancy Load Per Floor	*Minimum Number of Exitways*
Not more than 500	2
501 to 900	3
901 to 1800	4
Over 1800	5

The required exits shall be remote and independent of each other and located on opposite sides of the area served.

108.42. Width of Exitways.—The stories above or below grade shall be provided with not less than two (2) enclosed stairways of noncombustible construction meeting the fire-resistive requirements of table 5, Basic Building Code. Such stairways shall be not less than three (3) feet eight (8) inches wide, leading directly to the street or to an outside area with unobstructed egress to the street. The aggregate width of exitways and stairways shall be divided into substantially equal units and no stairway shall be more than eight (8) feet wide.

108.43. Treads and Risers.—The dimensions of treads and risers shall comply with section 108.8. The total rise of any single run of stairways between landings and intermediate platforms shall be not more than eight (8) feet and all stairways shall have handrails on each side.

108.44. Mixed Use Groups.—When places of assembly, night clubs and rooms and spaces for similar occupancies are provided in buildings of residence or business uses, the exitways shall be adequate for the combined occupancy and the means of egress from the place of assembly shall be separated from other parts of the structure. No skating rinks shall be located below the floor nearest grade. The incidental storage and use of all flammable and volatile liquids shall comply with section 404 of the Basic Building Code including the finishing rooms of bowling alleys which shall be separately enclosed in two (2) hour fire-resistive construction with floor finish of concrete or other noncombustible, nonabsorbent material.

108.45. Construction and Location of Theaters.—No theater, including motion picture theaters, shall be located above or below the grade floor of any building. All theaters and other buildings of the assembly use group shall be regulated by the height and area limitations of table 6, Basic Building Code; and when more than two (2) stories in height shall be of not less than one and one-half (1½) hour fire-resistive construction.

All auditoriums equipped with an enclosed stage, movable scenery, scenery loft, dressing rooms and other theatrical equipment shall comply with the requirements of the Basic Building Code governing such places of public assembly. (See section 418.0, Basic Building Code.)

108.46. Aisles.—When fixed seats are provided, all rows of seats shall be individually fixed or fixed in rigid units between longitudinal aisles not less than thirty-six (36) inches wide; except that aisles with banks of seats on one side only shall be not less than thirty (30) inches wide and in churches and chapels not less than twenty-four (24) inches wide. Rows of seats shall be not less than thirty-two (32) inches back to back.

When no fixed seats are provided, the tables and chairs in all rooms and spaces for public assembly shall be arranged to permit convenient access to exit doors by unobstructed aisles which are not less than thirty-six (36) inches wide.

108.47. Number of Seats.—There shall be not more than seven (7) seats intervening between any seat and the aisle or aisles. Where continuous fixed benches are used, a minimum width of eighteen (18) inches shall be provided for each person.

108.48. Panic-Proof Hardware.—In all rooms or places of public assembly with an occupancy load of more than three hundred (300), exit doors shall be equipped with panic-proof latches or bolts which release under a pressure of fifteen (15) pounds.

108.49. Roof Areas.—Roof areas occupied as roof gardens or for assembly purposes on any building shall be provided with not less than two (2) approved means of egress.

108.5. Institutional Buildings.—All institutional buildings shall have not less than two (2) exitways leading directly to the street or open spaces with direct access to the street equipped with doors swinging in the direction of egress, complying with the provisions of section 108.3 and as herein specifically provided.

108.51. Exit Doors.—Exit doors from hospitals and infirmaries shall be not less than four (4) feet wide in the clear.

108.52. Aisles and Corridors.—Aisles and corridors leading to exit doors shall be not less than five (5) feet wide.

108.53. Door Hardware.—In rooms of the institutional use group occupied as places of detention, exit doors shall be equipped with approved releasing devices with remote control for emergency use.

108.54. Construction Limitations.—All buildings of the institutional use group shall be of three-quarter (¾) hour protected frame, protected ordinary, heavy timber mill or protected noncombustible construction when two (2) stories in height, and of not less than one and one-half (1½) hour protected noncombustible or fireproof construction when three (3) stories in height.

108.6. Attic and Roof Access.—When not provided with stairways, all attic spaces and roofs, except pitched roofs with a slope exceeding twenty (20) degrees, shall be provided with means of access by scuttle and ladder. Access trap doors shall be not less than two (2) feet by three (3) feet in area, constructed of metal-covered wood or of approved noncombustible materials.

108.7. Exit Signs and Lights.—All approved means of egress in other than one- and two- and multi-family dwellings shall be indicated with approved metal signs reading "EXIT" in red letters not less than six (6) inches high on a white background, or in other approved distinguishable colors. Such signs shall be illuminated by an electric light of not less than twenty-five (25) watts, or be internally illuminated with an enclosed case of noncombustible material through ruby glass by at least two (2) lamps totaling not less than fifteen (15) watts visible from the exit approach. When necessary, such signs shall be supplemented by directional signs in the access corridors indicating the direction and way of egress.

108.8. Construction of Stairways.—Except as provided for one- and two-family and multi-family dwellings in sections 108.1 and 108.2 and as further modified in this section, stairs and landings serving as exitways shall be constructed of approved noncombustible materials without openings in the enclosure other than the necessary exit doorways and window or skylight openings for light or ventilation except for wood handrails and fire-retardant finish materials applied directly over a noncombustible base. Slow-burning trim materials may be used when applied directly to a noncombustible base. They shall be built with solid risers, treads and platforms and all finished floor surfaces of approved nonslip, noncombustible materials; and shall be designed for the live loads specified in table 4.

108.81. Combustible Stair Construction.—In buildings of exterior masonry wall and frame (type 3 or type 4) construction, with occupancy loads of not more than seventy-five (75) above nor more than forty (40) below the grade floor, in all use groups other than assembly and institutional buildings, the stairways may be constructed of wood or other materials of similar combustible characteristics; except that in no case shall combustible stairs be permitted in school buildings.

108.82. Enclosures of Combustible Stairs.—The enclosure and the underside of combustible stair construction, except in one- and two-family dwellings, shall be protected with partitions and ceilings of not less than three-quarter (¾) hour fire resistance, firestopped as specified in section 119.9, and the space below the stairs shall be kept open or shall be solidly enclosed with three-quarter (¾) hour fire-resistive partitions.

108.83. Treads and Risers.—The dimensions of risers and treads shall comply with the following requirements:

Use Group	*Maximum Riser*	*Minimum Tread*
One- and two-family dwellings (use group L-3)......	8¼″	9″ plus 1¼″ nosing
All other residential (use groups L-1 and L-2)........	8″	9″ plus 1¼″ nosing
Assembly and institutional..............................	7½″	9½″ plus nosing
Business	7¾″	9½″ plus nosing

108.84. Paint Finishes.—No pyroxylin paints or similar finishes shall be applied in exitways which, as dry films, produce excessive smoke or toxic fumes when exposed to fire.

108.9. Construction of Fire Escapes.—All fire escapes shall be constructed of approved noncombustible materials for the live loads specified in table 4; except that on buildings of type 3 or type 4 construction, fire escapes which accommodate not more than twenty (20) persons may be constructed of wood members not less than two (2) inches in thickness outside the fire limits. When located on the front of a building and projecting beyond the street lot line, the lowest platform shall be not less than ten (10) nor more than fourteen (14) feet above grade, equipped with a counter-balanced stairway and a fixed ladder to the roof. In alleyways and thoroughfares less than thirty (30) feet wide, the clearance under the lowest balcony shall be not less than fourteen (14) feet. Stairs of fire escapes shall be not less than twenty-two (22) inches wide, with risers not more than and treads not less than eight (8) inches, and platforms at foot of stairs not less than forty (40) inches wide by thirty-six (36) inches long, located not more than eight (8) inches below the access window or door. In other than one- and two-family and multi-family dwellings, doors and windows below and along the fire escape shall be equipped with three-quarter (¾) hour opening protectives or their approved labeled equivalent.

SECTION 109.0. DESIGN LIVE LOADS

109.1. Minimum Floor Loads.—The live loads to be assumed in the design of buildings and structures shall be not less than the minimum uniformly distributed superimposed unit loads prescribed in table 4 in addition to all dead loads of the structure and fixed service equipment.

Table 4.—Minimum Uniformly Distributed Live Loads

Use	Pounds per square foot
Assembly, fixed seats	60
Assembly, removable or no seats	100
Class rooms, fixed seats	60
Class rooms, removable seats	100
Dwelling rooms, first floor	40
Exitways, other than 1- and 2-family dwellings.	100
Garages, passenger cars	75
Garages, buses and trucks	
floor slabs	175
columns, beams and girders	120
Habitable attics and dwelling rooms other than first	30
Lofts and light manufacturing	125
Office rooms	50
Public parking decks, passenger cars only	
parts of floor accessbile to wheel loads	75
parts of floor not accessible to wheel loads	50
Sidewalks, vehicular driveways and yards	250
Stables	75
Storage	
light	125
heavy	250
Stores and shops	
retail—grade floor	100
—upper floors	75
wholesale	125
Uninhabitable attics	20
Yards and terraces, pedestrian	100

109.2. Roof Loads.—Flat and pitched roofs shall be designed for a minimum live load of twenty (20) pounds per square foot in areas not subject to snow loads and for a minimum of thirty (30) pounds per square foot of horizontal projection in areas subject to snow loads, as indicated by the average undrifted snow depths record of the U. S. Weather Bureau listed in Appendix B for minimum design loads.

109.21. Curved Roofs.—When the effect of slope as determined by actual test indicates lesser snow retention value, the roof load may be decreased accordingly, but in no case shall the load be assumed less than ten (10) pounds per square foot of horizontally projected roof area. When valleys are formed by a multiple series of such roofs, special provision shall be made for the increased load at the intersections.

109.22. Incidental Assembly.—Roofs of residence buildings used for incidental promenade purposes shall be designed for a minimum live load of sixty (60) pounds per square foot. All other roofs used for roof garden or assembly purposes shall be designed for a live load of one hundred (100) pounds per square foot.

109.23. Overhanging Eaves.—In other than one- and two-family dwellings, overhanging eaves, cornices and other roof projections shall be designed for a minimum uniformly distributed live load of seventy-five (75) pounds per square foot.

109.3. Wind Loads.—Except in geographical localities subject to winds of hurricane intensity, wind loads may be generally neglected unless the height of the structure is greater than four (4) times the minimum width, and except further as provided in sections 109.31 and 109.32.

109.31. Anchorage.—Roof framing shall be anchored to wall framing and walls to foundations to resist wind uplift and distortion.

109.32. Uplift on Eaves.—Overhanging eaves, cornices and other roof projections shall have adequate strength and stiffness to withstand an upward wind pressure of forty (40) pounds per square foot.

109.33. Ground Signs and Towers.—The wind pressure on ground signs and towers other than radio and television towers shall be assumed at fifteen (15) pounds per square foot of net exposed area normal to the wind for structures up to fifty (50) feet in height and twenty (20) pounds per square foot for structures over fifty (50) feet in height.

109.34. Roof Structures.—The wind pressure on roof signs, tank towers, stacks, chimneys and other exposed roof structures with plane surfaces shall be assumed at thirty (30) pounds per square foot applied on the net projected area of the structure normal to the wind.

109.35. Radio and Television Towers.—Radio and television towers over twelve (12) feet in height shall be constructed of steel or other approved corrosion-resistive noncombustible materials; except that isolated radio towers may be constructed of wood when not more than one hundred (100) feet in height. The structure shall be securely braced and anchored to resist a wind load of not less than thirty (30) pounds per square foot on the net area of both sides of latticed construction plus projected area of ice-covered antennae where subject to freezing temperatures. Antennae structures for private radio or television reception not more than twelve (12) feet in height may be erected on any building without a building permit. Such structures shall in no case be erected nearer to the lot line than the total height of the structure; nor shall such structure be installed near overhead electric lines nor encroach upon any street or public space.

109.4. Earthquake Loads.—In regions or under conditions which are exempt from earthquake load requirements according to section 719.14 of the Basic Building Code, all buildings and structures erected under this code shall be exempt from such requirements. In all other instances, structures of all buildings and their foundations shall be designed and constructed to resist a horizontal force acting in any direction of not less than five (5) per cent of the dead load of the completed structure; and wall parapets and exterior ornamental projections shall be capable of resisting a lateral force of not less than one hundred (100) per cent of the dead weight of the wall or other projection.

109.5. Live Load Reduction.—In the design of columns, trusses, girders, walls, piers and foundations of buildings more than one (1) story in height, design live loads of one hundred (100) pounds per square foot or less may be reduced in all use groups other than public assembly as follows:

	Storage Buildings	*Business Buildings*
	(Live loads 100 *pounds or less)*	
2 floors and roof	5%	10%
3 floors and roof	10%	20%

No reduction shall be made in the specified roof live loads.

SECTION 110.0. FOOTINGS AND FOUNDATIONS

All buildings and structures shall have foundation walls, piers, piles, continuous slabs or other approved foundations which shall be designed to resist frost action or shall be founded on bed rock. All footings shall be designed to distribute the load as nearly uniformly as practicable. Where permanent frost lines occur, footings may be founded on frozen soils.

110.1. Presumptive Surface Bearing Values of Foundation Materials.—Satisfactory bearing materials for foundations and footings shall include ledge rock on its natural bed; natural deposits of coarse or medium sand, gravel or dry clay, or a combination of such materials, provided they do not overlie an appreciable amount of peat, organic silt, moist or wet clay or other objectionable materials.

Unless otherwise approved by the building official, the maximum allowable pressures under spread footings at or near the surface shall not exceed the values specified in table 7. When the safe sustaining power of the soil is in doubt, or superior bearing values than herein specified are claimed, the building official may direct borings or tests to be made and shall determine the safe value to be allowed. Field loading tests shall be made when required by the building official. (See sections 725, 726, 727, Basic Building Code.) Pile foundations shall be designed to transmit building loads to lower strata of foundation materials in accordance with the provisions of sections 737 to 748, inclusive, of the Basic Building Code.

Table 7.—Presumptive Surface Bearing Values For Spread Footings

Foundation material	Tons per square foot
Hard sound rock	60
Medium hard rock	40
Soft or broken bed rock	8
Compacted gravel, and sand and gravel	6
Compacted coarse sand, and hard dry clay	4
Loose coarse sand, confined	3
Loose medium sand, confined	2
Firm or stiff clay	1½
Soft broken shale, or soft clay	1

110.2. One-Story Buildings.—Mud, organic silt or unprepared fill shall be assumed to have no bearing capacity, unless approved by test, except where deemed adequate by the building official for the support of light frame structures or buildings and where permitted under the provisions of this code.

110.3. Floating Mat.—Footings for other than small frame structures not exceeding one (1) story in height and twelve hundred and fifty (1250) square feet in area shall be located on permanently undisturbed soil; except that a continuous foundation mat of reinforced concrete or other approved construction may be used when floated directly on the ground provided with a layer of broken stone not less than six (6) inches thick, or other adequate means of subsoil drainage. When required, such mats shall be installed with a ratproof apron as specified in section 116.4. The reinforcement shall be in addition to any piping installations for radiant heat purposes and the structural slab shall be not less than four (4) inches thick of approved concrete as specified in section 112.2. The requirements governing ventilation of crawl spaces in section 115 shall not be deemed to nullify the use of floating slab foundations provided adequate provision is made for dampproofing and waterproofing when required by soil conditions.

110.4. Timber Footings.—Wood footings shall be used only when installed entirely below the permanent water line for wood frame structures, or when treated with an approved pressure preservative process, or when installed as capping of wood piles over submerged or marsh lands.

110.5. Masonry Footings.—Masonry footings for walls, columns or piers shall consist of plain or reinforced concrete or solid unit masonry as herein provided:

110.51. Wall Footings.—Concrete footings for load bearing walls shall be of adequate dimensions to distribute the load and unless otherwise required by local conditions shall be not less than sixteen (16) inches wide and eight (8) inches thick; except that for one (1) story and basement buildings with wood frame or brick veneered walls, footings that are not more than twelve (12) inches wide may be six (6) inches thick.

110.52. Pier and Column Footings.—Concrete footings for piers and columns shall have a minimum area of three (3) square feet and a minimum thickness of twelve (12) inches.

110.53. Chimney Footings.—Concrete chimney footings shall have a minimum projection of six (6) inches beyond the chimney foundation and a minimum thickness of twelve (12) inches.

110.54. .Concrete Deposition.—No concrete footings shall be poured through water unless deposited by approved means to insure minimum segregation of the mix and negligible turbulence of the water; and all footings shall be protected from freezing during deposition and for a period of not less than five (5) days thereafter.

110.55. Masonry Unit Footings.—Masonry unit footings shall be laid in cement, cement-lime or other approved masonry mortar; and the width shall be not less than eight (8) inches wider than the wall or pier supported and the depth shall be not less than two (2) times the projection beyond the wall or pier. The maximum offset of each course in brick unit footings shall be one and one-half (1½) inches if laid in single courses and three (3) inches if laid in double courses.

110.56. Reinforced Concrete Footings.—When reinforced concrete footings are required, the edge thickness of the footings shall be not less than five (5) inches above the reinforcement with a minimum covering under the reinforcement of three (3) inches. On pile capping, there shall be not less than twelve (12) inches of concrete above and four (4) inches below the pile cut-off.

110.6. Foundation Walls.—The thickness of foundation walls shall be not less than the thickness of the wall supported and the minimum thickness shall be limited for the various materials of construction as herein specified; except that eight (8) inch foundation walls shall be permitted under brick veneered frame and ten (10) inch cavity walls when the total height of the wall including the gable is not more than twenty (20) feet. Not more than two (2) inch corbels shall be provided to furnish bearing for the full thickness of the wall supported. The top corbel course shall be a full header course, extending not higher than the bottom of the floor joists. No individual corbel shall project more than one-third (⅓) the height of the individual unit.

110.61. Reinforced Concrete.—When reinforced concrete is required to resist all stresses, the walls shall be not less than eight (8) inches thick.

110.62. Hollow or Solid Masonry and Plain Concrete.—When not more than six (6) feet deep, masonry walls shall be not less than eight (8) inches thick; and when more than six (6) feet below grade, not less than twelve (12) inches thick. Foundation walls of approved hollow masonry units shall be provided with not less than four (4) inches of solid masonry at girder bearings or shall be strengthened with buttresses.

110.63. Rubble Stone.—Walls of rubble stone shall be not less than sixteen (16) inches thick and shall be bonded as required in section 112.36.

110.64. Bonding.—All foundation walls shall be bonded as required for superstructure walls in section 112.3.

110.7. Lateral Stability.—When required by the character of the soil or other local conditions, all foundation walls below grade and all retaining walls shall be strengthened with buttresses or additional wall thickness to resist lateral soil or hydrostatic pressure; and the foundation slabs and other footings subjected to water pressure shall be designed to resist a uniformly distributed uplift equal to the full hydrostatic pressure. In no case shall the reinforcement in reinforced concrete walls be less than specified in section 116.2.

110.8. Drainage.—When a building or structure is floated on a foundation slab located directly on soil without a cellar, the footing materials below and around the perimeter of the slab shall be constructed to afford adequate drainage in accordance with section 110.3. When a cellar is provided and the foundation walls are of inadequate strength and tightness to resist lateral water pressures, drain tile or equivalent drainage ditches shall be provided around the perimeter of the footings.

110.9. Mortar in Masonry Foundation Walls.—All masonry walls and foundations in contact with the earth shall be laid up with portland cement or approved masonry mortar complying with section 112.

SECTION 111.0. WOOD FRAME CONSTRUCTION

Exterior walls and interior partitions of wood frame structures which are constructed of either balloon, braced or platform types shall consist of sills, posts, girts and ribbon strips braced to develop the required strength and rigidity in compliance with the requirements of this section and as specified in appendix D-5, tables 12 and 13 of this code. The frame shall be braced at all angles or adequately sheathed and the floor, attic and roof framing of wood joists, beams and rafters shall be secured by nailing as specified in appendix F; or by any other approved connecting devices of equal strength.

111.1. Grades and Sizes.—All lumber and timber used in load bearing members shall be sound, free from rot and large or loose knots, and damaging diagonal or spiral grain; and shall be of the structural grade corresponding to the stresses used in the design. When the grade of lumber is not identified in accordance with the National Design Specifications for Stress-Grade Lumber, the maximum allowable working stresses for the species of lumber used shall not exceed the lowest stress values given for that species. All lumber sizes herein specified are nominal sizes; and the American Lumber Standards for dressed sizes shall be accepted as the corresponding minimum net dimensions on which all structural design shall be based. Except as herein provided for composite or built-up integrated units, or when approved after test as specified in section 105, no wood floor beam, roof beam, joist, rafter or framing timber shall be less than two (2) inches in thickness.

111.2. Floor Joists and Rafters.—For ordinary conditions of use and live loads, the spans of joists and beams shall be limited by tables 8, 9, 10 and 11 in appendix D-4 of this code.

Note: Stress-Grade Materials.—The wood beam and wood joist tables of the ABC are based on average materials available in general yard lumber stocks with a working stress in bending of one thousand (1000) pounds per square inch and a modulus of elasticity of one million (1,000,000) pounds per square inch. When stress-grade lumber or other stress-grade materials are used and the material is properly identified and controlled as to strength and quality, higher working stresses may be used in accordance with the accepted engineering practice standards listed in appendix B governing the specific material.

111.21. Bridging.—In all floor, attic and flat roof joist framing, there shall be not less than one line of bridging for each eight (8) feet of span and the bridging shall be of not less than one by three (1 x 3) inch lumber double-nailed at each end, or of equivalent metal lateral bracing of equal rigidity secured at the intersection. A line of bridging shall also be required at supports where adequate lateral stiffness is not otherwise provided.

111.22. Cutting and Notching.—In girders, beams or joists, cuts and bore holes shall not be deeper than one-fifth (1/5) the beam or girder depth or more than two (2) inches in diameter; and shall not be located nearer to the end of the span than three (3) times the beam depth nor within the center third of the span, unless reinforced to meet stress calculations. In studs of bearing walls or partitions, notches made to receive piping or duct work, or for other fabrication purposes, shall be cut not more than one-third (1/3) the depth of the stud, or the required studs shall be doubled or otherwise reinforced.

111.23. Connections and Fastenings.—All structural members shall be connected and fastened at their junction with connectors, bolts, lag screws, spikes, nails, straps or other approved devices or by approved gluing as provided herein and in accordance with the recommended nailing schedule in appendix F.

111.24. Plates and Ribbon Boards.—Plates which are used in exterior walls to support joists or rafters shall be double, of the same width as the supporting studs and each not less than two (2) inches thick. In non-bearing partitions, at least one (1) top and bottom plate shall be provided of the same width as the studs; and the partition shall be firestopped as required in section 119.9. Ribbon boards which support floor or roof joists shall be not less than one by four (1 x 4) inches in size and shall be nailed thereto as required by the nailing schedule. Sills shall be at least the equivalent of a two by six (2 x 6) inch stud.

111.25. Roof Rafters.—Roof rafters shall be vertically supported at the ridge or shall be adequately trussed or tied together with not less than one by six (1 x 6) inch collar beams spaced not more than five (5) feet on centers, and each rafter shall be fastened to the wall plate or wall studs.

111.26. Multiple Joists and Rafters.—Floor joists under bearing partitions shall be doubled or formed of built-up sections or may be replaced by a solid section of adequate strength to support the load. Dormer windows and other openings in roofs shall be framed with double rafters and headers. Valley rafters on spans over twelve (12') feet, measured horizontally, shall be doubled.

111.27. Bearing and Anchorage on Girders.—Floor beams framing into girders shall be anchored, tied or nailed to secure continuity. The ends of all beams or joists resting on girders shall bear not less than four (4) inches or shall be supported in approved metal stirrups or on wood clips or ribbon strips not less than two by three (2 x 3) inches in size. Beams or joists framing from opposite sides shall either lap not less than six (6) inches and be securely bolted or spiked together, or when framing end to end, all joists, beams and girders shall be secured together by approved metal ties, straps or dogs.

111.28. Joints in Girders.—The joints of solid or built-up beams or girders shall be made over column or pier supports when constructed as simple spans. When constructed of multiple joists as continuous girders, the joints shall be broken in adjoining joists; and all joints shall be located between one-sixth (1/6) and one-quarter (¼) the span length from supports and shall be securely nailed or otherwise bonded together in an approved manner.

111.29. Spacing of Beams.—Beams and joists shall be spaced not more than twenty-four (24) inches on centers for one inch floor or roof sheathing except for approved, integrated assemblies; and for heavier planking, the spacing shall be not more than thirty-two (32') times the thickness of the planking, center to center of beam supports; except that when reinforced with finish flooring, the span of sub-floor planking shall not exceed forty-eight (48) times the thickness of the planks.

111.3. Headers and Trimmers.—All headers more than four (4) feet in length and their trimmers shall be doubled. Headers with four (4) or more tail beams or six (6) feet or more in length shall be supported on approved metal joist hangers. When nailing is permitted, the tail and header beams shall be secured in accordance with the nailing schedule in appendix F. All tail beams or joists which are twelve (12) feet or more in length shall be hung in approved joist or beam hangers. All trimmer beams supported on walls or partitions of frame construction shall be spiked together.

111.4. Walls, Partitions and Posts.—The load-bearing value of isolated posts or struts shall be limited by table 12 and of framed walls and partitions by table 13, appendix D-5, of this code. All wood posts used in basements or cellars shall have concrete bases which extend not less than three (3) inches above the finished floor and bear directly on the post footing. When flooring of concrete or other approved impervious materials is not provided, the concrete base shall extend not less than six (6) inches above the finished floor.

111.41. Multiple Stories.—When the frame is more than one (1) story in height and studs or posts are not continuous from sill to roof, the members shall be secured together with approved clips, splices or other connections to insure continuity and a well-integrated structure. Sheet metal clamps, ties, or clips shall be formed of galvanized steel or other corrosion-resistive materials, of not less than No. 20 U. S. gage steel for two (2) inch framing members and not less than No. 18 U. S. gage in thickness for three (3) inch members. For four (4) inch and larger members, column splices and beam and girder supports shall be effected with approved post caps of metal or reinforced concrete or with through-bolted corbel blocks or side bolsters.

111.42. Bracing.—In buildings more than one (1) story in height, corner posts shall be the equivalent of not less than three (3) pieces of two by four (2 x 4) inch studs braced by not less than one (1) piece of one by four (1 x 4) inch diagonal let into the studs; or the frame shall be sheathed with a material to afford the same rigidity or by other approved method. Diagonal bracing may be omitted when sheathing is provided in accordance with section 111.53.

111.43. Framing Over Openings.—Lintels over openings in bearing walls or partitions of one- and two-family dwellings shall consist of double joists not less than herein specified or trussed construction bearing on jack studs, or other approved construction affording adequate strength:

Spans less than four (4) feet....................	two 2 x 4
Spans four (4) feet to six (6) feet..............	two 2 x 6
Spans six (6) feet to eight (8) feet..............	two 2 x 8
Spans eight (8) feet to ten (10) feet............	two 2 x 10

111.44. Foundation Anchorage.—When required to resist wind uplift, wall sills shall be anchored to foundation walls at corners and at intermediate intervals of not more than eight (8) feet with one-half (½) inch bolts embedded in the masonry foundation to a depth of not less than eight (8) inches.

111.45. Framing of Openings.—All windows and door openings shall have double studs for the full height of the opening at jambs, with double headers or trussed construction over the opening as provided in section 111.43, or by other approved methods or connection devices to support the superimposed loads.

111.5. Wall Sheathing and Roof Decking.—Exterior walls of enclosed frame buildings shall be sheathed as herein provided.

111.51. Types of Sheathing.—Except when back-plastered stucco construction is used, or the stucco is furnished with a wrapping of No. 18 U. S. gage wire attached horizontally on the studs at six (6) inch intervals, the sheathing of all exterior frame walls shall consist of one of the following materials or any other approved material of equal strength and durability approved by the building official: 1 inch reinforced cement mortar; 1 inch wood sheathing; ½ inch gypsum boards; ½ inch fiber boards; 5/16 inch plywood.

111.52. Nailing. Wood sheathing boards shall be nailed to each stud and to the top and bottom plates and sills as provided in the nailing schedule (appendix F.).

111.53. Omission of Bracing.—The diagonal bracing specified in section 111.42 may be omitted when diagonal wood sheathing or vertically applied plywood or other approved sheathing is installed in panels not less than four (4) feet by eight (8) feet in area.

111.54. Paper-Back Lath Sheathing.—In one- and two-family dwellings and one (1) story business buildings with brick or other masonry veneers, the sheathing may consist of a layer of approved paper-backed wire fabric of not less than No. 16 U. S. gage galvanized wire with stiffening ribs not more than five (5) inches on center, to which is attached a double layer of fibrous waterproof backing. The veneer shall be laid up with a one (1) inch intermediate space which shall be mortar filled as each course of brick is applied.

111.55. Types of Roof Decking.—Roof deck sheathing shall consist of not less than one (1) inch boards or approved plywood of the thickness specified herein or other approved materials of equivalent strength and rigidity. If open-deck sheathing is used on pitched roofs, it shall consist of not less than one by four (1 x 4) inch roofers spaced not more than six (6) inches on centers.

The maximum spans of horizontal load-bearing plywood sheathing and roof decking shall be limited by the allowable stresses and deflection for the design live load, but shall have not less than the following thickness when laid parallel to the load-supporting span:

Thickness of Plywood	*Maximum Horizontal Span (Laid Parallel to Span)*	
	40-*Pound Live Load*	20-*Pound Live Load*
5/16 inch	16 inches	20 inches
3/8 inch	20 inches	24 inches
1/2 inch	24 inches	30 inches
5/8 inch	30 inches	36 inches

111.6. Exterior Weather Boarding and Veneers.—All exterior wall coverings shall be of approved moisture- and weather-resisting materials of sufficient stiffness and properly attached to resist rain and wind.

111.61. Types of Weather Wall Coverings.—The following materials shall be accepted as approved weather coverings of the nominal thickness specified:

Brick masonry veneers	2 inches
Stone veneers	2 inches
Clay tile veneers	3/8 inch
Stucco or exterior plaster	3/4 inch
Wood siding	1/2 inch
Precast stone facing	5/8 inch
Protected combustible siding	1/2 inch
Wood shingles	3/8 inch
Exterior plywood	5/16 inch
Asbestos shingles	5/32 inch
Asbestos cement boards	1/8 inch
Aluminum clapboard siding	0.030 inch
Formed metal siding	28 gage

111.62. Nailing Weather Boarding, Wall and Roof Coverings.—All weather boarding and wall and roof coverings shall be securely nailed with aluminum, copper, zinc, zinc coated or other approved corrosion-resistive nails into the supporting structure in accordance with the recommended nailing schedule or the approved manufacturer's standards. Shingles and other weather coverings attached directly to sheathing less than one (1) inch thick shall be secured with barbed or other mechanically-bonding nails of an approved type; or by common nails on furring strips attached to the studs.

111.63. Exterior Stucco.—All stucco work shall be reinforced with approved metal lath or wire fabric as herein specified; except when applied directly to a masonry base, or when installed on a masonry base which is protected with bituminous surfacing. The reinforcing fabric shall be coated with zinc or other approved rust-resistive coating, or shall be manufactured from corrosion-resistive alloys.

Type of Reinforcement	*Minimum U. S. gage*	*Maximum Mesh inches*	*Minimum Weight Pounds per Square Yard*
Metal lath	—	—	1.8
Expanded metal	—	—	3.4
Woven wire	18	1	1.74
Woven wire	17	1½	1.41
Woven wire	16	2	1.47
Welded wire	18	4 sq. in.	0.67
Welded wire	17	4 sq. in.	0.82
Welded wire	16	4 sq. in.	1.10

When applied over approved sheathing, a covering of fourteen (14) pound waterproof felt or paper shall first be attached to the sheathing. In back-plastered stucco with the stucco extending not less than five-eighths (⅝) inch back between the studs, the waterproof paper backing may be omitted. All metal reinforcement shall be furred away from sheathing or building paper not less than one-fourth (¼) inch with self-furring lath, metal strips or approved furring nails. When applied directly to masonry or monolithic concrete, the surfaces shall be roughened, hacked or bush-hammered to provide bond or a preparatory dash coat of portland cement grout shall be applied and kept damp for at least two (2) days after application and before applying succeeding stucco coats. At all times during application and for a period of not less than forty-eight (48) hours after application of each coat, provision shall be made to keep stucco work above fifty (50) degrees F. Stucco shall be kept a sufficient height above ground surfaces as provided in section 111.69 and all sills, coping and projecting courses shall be flashed and provided with drips to avoid water damage.

111.64. Masonry Veneers.—Veneers of unit masonry on wood framing shall be securely attached to the wood frame with corrosion-resistive anchors at vertical intervals of not more than sixteen (16) and horizontal intervals of not more than twenty (20) inches; except clay tile, three-eighth (⅜) inch in thickness, when bonded to a three-quarter (¾) inch reinforced cement mortar base as provided in Section 112.27. Fourteen (14) pound waterproof felt or paper shall be attached securely to the frame back of the veneer and flashing as required in section 111.7 shall be provided where necessary to prevent moisture penetration behind the veneers. The average height of the four (4) inch brick veneer construction shall be not more than twenty-five (25) feet above its supports on the foundation wall or on corbels of masonry or steel and two (2) inch stone veneers shall not exceed a height of eighteen (18) feet. The corbel shall project not more than two (2) inches from the face of the foundation wall as specified in section 110.6.

111.65. Metal Veneers.—Veneers of metal shall be fabricated from approved corrosion-resistive materials or shall be protected front and back with porcelain enamel or shall be enameled or otherwise treated to render the metal resistant to corrosion. Protected steel veneers shall be not less than No. 28 U. S. gage and aluminum siding not less than three hundredths (0.03) inch in thickness, mounted on wood or metal furring strips or approved sheathing on the frame construction.

111.66. Plywood Construction.—All plywood shall be identified as to veneer-grade and glue-type by the manufacturer's identification marks. Plywood for exterior use shall be of the exterior waterproof type and for interior use shall be of the moisture-resistant interior type or the exterior type.

111.67. Integrated Assemblies.—Approved panels or other integrated assemblies fabricated of dimension lumber with wood stress-coverings glued thereto or consisting of structural units of metal-covered or molded plywood, or other approved plastics, formed and molded into prefabricated load-bearing members shall be permitted for use in floors, roofs, walls, partitions and ceilings when designed in accordance with accepted engineering practice or meeting the test requirements of section 105 of this code. All structural members shall be so connected at their junction to provide a well-integrated structure with tight weatherproof joints where exposed to the weather. The fastenings of stressed panel coverings to longitudinal or transverse structural studs or ribs shall provide rigidity equivalent to approved gluing. Nailing shall not be acceptable for this purpose. The glues used in structural assemblies of built-up or laminated lumber sections or for gluing plywood to wood framing members shall develop the full strength of the wood, shall not produce decomposition or deleterious chemical reaction in the wood structure and shall not be attractive to vermin. The glues shall be handled, mixed and applied by approved fabricators in accordance with the manufacturer's specifications. For general interior uses or for exterior use protected against the weather, group 1 glues shall be used, including among others, casein glue with mold-resistant preservative, urea-resin glue, phenol or phenol-resorcinol resin glue or their approved equivalent. For exterior use with full exposure to the weather, or for interior use when subjected to high humidity, group 2 glue shall be used, including among others, resorcinol-resin, phenol-resin or mellamine resin glues or their approved equivalent.

111.68. Spacing of Vertical Studs.—Maximum stud spacing for bearing wall and partition sheathing and for use in stress-skin panels or other prefabricated constructions shall be determined by accepted engineering analysis or by the tests prescribed for prefabricated assemblies. For average materials, the vertical loads shall not exceed the limits specified in table 13, appendix D-5. When stress-grade materials are used, the stresses and design shall conform to accepted engineering practice.

111.69. At Grade Protection.—All exterior structural and non-load bearing wood framework shall be supported on the foundation walls at heights necessitated by the greatest average snow fall in the locality, but in no case less than eight (8) inches above the finished grade. All untreated wood sill plates shall be isolated from masonry or concrete with waterproof felt or corrosion-resistive metal, or shall be bedded in a cement mortar topping which shall be finished to provide a true and even bearing. Exposed metal siding and sheathing shall be supported on the concrete apron specified in section 116.4 or on other approved water-resistant foundation supports extending to the minimum height above grade herein specified.

111.7. Flashing.—All exterior openings shall be constructed with approved corrosion-resistive flashings at top and sides or by other approved method to be leakproof. Similar flashings shall be installed at the intersection of chimneys or other masonry construction with frame or stucco walls and as required in veneer construction in section 111.64. Such flashing shall be provided with projecting lips on both sides under stucco copings; under and at the ends of masonry, wood or metal copings and sills; at wall and roof intersections; under built-in gutters; at junction of chimneys and roofs; at wall and roof intersections; and in all roof valleys and around all roof openings.

111.8. Protection of Wearing Surfaces.

111.81. Moisture Condensation and Water Leakage.—To secure weather-tightness and moisture resistance in framed walls and other hollow unoccupied spaces, the exterior wall shall be faced with approved weather-resisting covering as specified in this code; and cellular spaces shall be ventilated, or when required by the building official, interior non-corrodible vapor-tight barriers shall be installed; or other means shall be provided to avoid water leakage and moisture condensation.

111.82. Interior Surfaces.—In all habitable spaces, interior exposed wall and partition surfaces shall be faced with materials which are capable of resisting a horizontal load of not less than five (5) pounds per square foot. Combustible materials used as finish shall not exceed the limits of combustibility prescribed by section 904.4 of the Basic Building Code.

111.9. Fire-Resistance and Clearance of Combustible Framing.—When required to meet fire-resistive performance for specific applications and uses by the provisions of this code, structural wood units and assemblies shall be protected with metal, or other component materials, or shall be treated by approved pressure processes to develop the fire-resistance ratings specified in this code, or as regulated by table 5 of the Basic Building Code.

111.91. Clearance from Chimneys.—Combustible framing shall be trimmed away from all flues and chimneys and no such combustible material shall be placed within two (2) inches of any chimney nor within six (6) inches of any inlet opening to such chimney. Finished flooring shall have not less than one-half (½) inch clearance from the chimney walls; except such flooring may be in contact with masonry flues for a distance of not more than three (3) inches from the chimney corner.

111.92. Clearance from Fireplaces.—All combustible header and trimmer beams shall be placed not less than four (4) inches from the face and backs of fireplaces and the spaces shall be fire-stopped as required in section 119.9. Wood or other combustible trim shall not be installed on or about a fireplace less than six (6) inches from the fireplace opening; and when located within the twelve (12) inch boundary of the opening, such combustible construction shall project not more than one-eighth (⅛) inch from the face of the masonry for each one (1) inch distance from the fireplace opening; and no combustible mantel shall be located less than twelve (12) inches above such opening.

SECTION 112.0. MASONRY CONSTRUCTION

112.1. Wall Thickness and Height.—In all buildings and structures not more than three (3) stories or forty (40) feet in height, covered by the provisions of this code, with a clear span between exterior walls or between walls and an interior support of not more than twenty-six (26) feet, the thickness of masonry bearing walls shall be not less than herein specified; but in no case less than one-twentieth (1/20) of the height between lateral supports. The finished thickness of interior non-bearing masonry partitions or walls shall be not less than specified in section 112.18.

112.11. Solid and Hollow Unit Masonry Construction.—For all buildings in other than the institutional and residence use groups bearing walls of brick, structural clay tile, hollow or solid concrete units, or stone ashlar, shall be not less than eight (8) inches thick in the top story, but not more than twelve (12) feet in height, and not less than twelve (12) inches thick in the lower stories.

Residence Buildings Not Exceeding Thirty-Five Feet.—The thickness of bearing and non-bearing walls in buildings of the residence and institutional use groups shall be not less than eight (8) inches, provided the total height of such eight (8) inch walls including any portion below grade is not more than thirty-five (35) feet.

Residence Buildings Exceeding Thirty-Five Feet.—In residence and institutional buildings which exceed thirty-five (35) feet in height, the thickness of walls in the second and third stories shall be not less than eight (8) inches provided the total height of eight (8) inch walls is not more than thirty (30) feet, and not less than twelve (12) inches thick in the first story.

One and One-Half Story Dwellings.—In dwellings not more than one and one-half (1½) stories or twenty (20) feet in height, interior masonry bearing partitions may be six (6) inches thick. The exterior masonry walls of dwellings and private garages which are not more than nine (9) feet in height to the eaves, nor more than fifteen (15) feet in height to the peak of the gable, may be six (6) inches thick.

112.12. Cavity and Hollow Wall Construction.—Both the facing and backing wythes of bearing and non-bearing walls of cavity or other hollow wall construction of solid units shall each be not less than four (4) inches thick. The wythes shall be bonded together to comply with section 112.3. The cavity shall be not less than two (2) nor more than four (4) inches wide and the total thickness of wall shall be not less than ten (10) inches in buildings which are not more than twenty-five (25) feet in height; and not less than fourteen (14) inches in buildings which are not more than forty (40) feet in height with the inner wythe not less than eight (8) inches thick.

112.13. Rubble Stone Construction.—Bearing and non-bearing walls of rubble stone shall be not less than sixteen (16) inches thick.

112.14. Plain Concrete Wall Construction.—Unreinforced mass concrete walls may be two (2) inches less in thickness than solid masonry construction; but in no case shall such walls be less than eight (8) inches thick except where six (6) inch walls are permitted in one and one-half (1½) story dwellings and private garages.

112.15. Composite Wall Construction.—Bearing and non-bearing walls constructed of a combination of hollow and solid masonry units forming a composite wall shall be not less in thickness than required for walls constructed of either of the materials forming the facing and the backing. There shall be not less than two (2) inches of solid masonry on the exterior face exposed to the weather. Such walls shall be bonded as required in Section 112.3 with headers extending not less than four (4) inches into the backing.

112.16. Veneer Masonry Construction.—The thickness of the backing in bearing and non-bearing walls of veneer masonry construction shall be of the required minimum thickness for solid or hollow unit construction specified in this section, except that brick, stone or other approved masonry facing not less than four (4) inches thick, bonded as required in section 112.3, may be included in the required thickness of the wall. No material used for veneering masonry walls shall have less than the following thickness:

Architectural terra cotta (cellular)	3 inches
Architectural terra cotta (flat slabs)	1¼ inches
Brick	2¼ inches
Stone (natural)	2 inches
Stone (cast, artificial)	1½ inches
Precast stone facing	⅝ inch
Clay tile (structural)	1¾ inches
Clay tile (flat slabs)	⅜ inch
Marble slabs	1 inch
Structural glass	11/32 inch
Aluminum	.03 inch
Metal (approved corrosion-resistive)	28 U. S. gage

Facing or veneers or masonry walls or partitions shall not be considered to have structural value unless bonded as required in section 112.35 and shall be excluded in determining required thickness of bearing walls.

112.17. Anchorage of Veneers.—Four (4) inch ashlar facing shall be bonded as required in section 112.35. Thin stone, tile and terra cotta veneers three (3) inches or less in thickness shall be frost-proof and not more than one hundred and forty-four (144) square inches in area when subject to frost action and when not so exposed, the size of the tile may be increased a maximum of fifty (50) per cent in area and shall be anchored with corrosion-resistive anchors as provided for unbonded ashlar. Veneers one (1) inch in thickness or less of stone, ceramic or porcelain tiles or terra cotta shall be set in a waterproofed, cement-mortar float coat, mounted on a one (1) inch thick mortar base. In localities subject to freezing temperatures, the base shall be reinforced as required for exterior stucco in section 111.63 and the veneers shall be anchored to the masonry backing.

112.18. Non-Bearing Partitions.—When required to develop fire-resistance ratings, interior non-bearing masonry partitions of terra-cotta, gypsum or other approved noncombustible materials shall be of the minimum thicknesses specified in table C-2 of appendix C; but in no case shall the unsupported height exceed the following unless reinforced or approved after test:

Solid Masonry (in Inches) *Thickness Exclusive of Plaster*	*Unsupported Height* *Feet*
2	8
3	12
4	15
6	20
8	25

Solid partitions of metal lath, studs and plaster may be two (2) inches thick for heights up to twelve (12) feet and shall increase one-quarter (¼) inch in thickness for each four (4) feet increase in height.

112.2 Mortar and Concrete Mixes.—All masonry shall be laid up in mortar with cement, lime and aggregates mixed to a workable consistency in the proportions by volume herein specified. Materials used in preparing gypsum mortar shall be measured by weight.

112.21. Cement Mortar.—Cement mortar shall be composed of one (1) part of approved portland cement and a maximum of three (3) parts of approved sand aggregates to which may be added hydrated lime or lime putty not to exceed twenty-five (25) per cent of the cement content by volume. All foundations and other masonry in contact with the ground and cavity walls shall be laid up in cement mortar or masonry mortars approved for this purpose.

112.22. Cement-Lime Mortar.—Cement-lime mortar shall be composed of one (1) part of approved portland cement to not more than one (1) part of approved lime putty or hydrated lime and a maximum of six (6) parts of approved sand aggregate, or shall be an approved masonry mortar. Such mortar may be used in all walls within the provisions of this code other than specified in section 112.21 and where gypsum mortars are permitted.

112.23. Lime Mortar.—Lime mortar shall be composed of one part of approved lime putty or hydrated lime and a maximum of three (3) parts of approved aggregate. Cement may replace equal volumes of lime in lime mortar, provided the cement gaging is uniformly distributed by approved methods of mixing. Lime mortar may be used in bearing walls not more than thirty-five (35) feet in height.

112.24. Gypsum Mortar.—Gypsum mortar shall be composed of one (1) part of unfibered calcined neat gypsum plaster and not more than three (3) parts of approved sand aggregate. Gypsum mortar shall be used in all gypsum block masonry partitions.

112.25. Mass Concrete Proportions.—Cast-in-place plain or mass concrete shall be mixed in the dry, volumetric proportions herein specified: one (1) part approved portland cement to not more than seven and one-half (7½) parts of approved graded aggregates with not more than eight and one-half (8½) gallons of water to one bag of cement.

112.26. Reinforced Concrete Proportions.—Concrete for reinforced concrete construction shall be mixed in the dry volumetric proportions herein specified: one (1) part of approved portland cement to not more than five and one-half (5½) parts of approved graded aggregates with not more than seven and one-half (7½) gallons of water to one bag of cement.

112.27. **Mortar Base for Clay Tile Veneers.**—Mortar setting beds for clay tile veneers on vertical surfaces shall be mixed in the dry volumetric proportions herein specified; one (1) part of approved portland cement, one-half (½) to one (1) part of hydrated lime and four (4) to seven (7) parts of approved sand aggregates. When dolomite limes are used, they shall be of the autoclaved type.

112.3. Bonding of Walls.

112.31. Solid Walls.—In solid brick masonry walls, the facing and backing shall be bonded together with not less than one (1) header course in each seven (7) courses; or with not less than one full length header in each one and one-half (1½) square feet of wall surface. The distance between adjacent full length headers shall in no case be more than twenty (20) inches either vertically or horizontally. Header bricks from opposite faces of the wall shall break joints at the inner ends in alternate courses in walls more than eight (8) inches thick.

112.32. Hollow Unit Walls.—In walls of hollow structural clay tile, concrete or other approved hollow masonry units, the stretcher courses shall be bonded at vertical intervals of not more than thirty-four (34) inches, either by lapping not less than three and three-quarter (3¾) inches over the unit below, or by lapping with units of not less than fifty (50) per cent greater thickness than the units below at vertical intervals of not more than seventeen (17) inches.

112.33. Cavity and Hollow Walls.—Hollow walls of solid units shall have a masonry bond equivalent to solid walls and the facing and backing shall be bonded together with headers or equivalent masonry bonding units with not less than one (1) header unit for each three (3) square feet of wall surface. Cavity walls shall be tied together with not less than three-sixteenths (3/16) inch rounds or one-eighth (⅛) by three-quarter (¾) inch flats of corrosion-resistive metal with not less than one (1) approved tie to each three (3) square feet of wall surface.

112.34. Composite Walls.—The facing shall be bonded to the backing with headers or stretchers not less than four (4) inches thicker than the facing to the equivalent extent of one-seventh (1/7) of the area of the wall as provided in section 112.31.

112.35. Ashlar Facing.—Facings of dressed natural or cast stone shall be bonded to the backing with at least one-seventh (1/7) of the superficial area extending not less than four (4) inches into the backing. In plain coursed ashlar, at least every fourth course shall be a bond course. Bond stones shall be uniformly distributed throughout the walls; except when alternate courses are full bond courses, every stone which is not a bond stone shall be anchored to the backing with an approved corrosion-resistive metal anchor to each three (3) square feet of superficial area or part thereof.

112.36. Rubble Stone Walls.—All stones in rubbly masonry shall be laid on their natural bed and the walls shall be bonded with at least one (1) through bond stone for each nine (9) superficial square feet of area when less than twenty-four (24) inches thick and one (1) bond stone on both sides for each six (6) square feet in area of thicker walls.

112.4. Hollow Wall Construction.

112.41. Bearing Area.—Joist, beam, girder and other concentrated loads shall be provided with a bearing of solid masonry in all hollow unit and hollow wall construction or with a bearing plate of two (2) inches of solid brick or the equivalent, and the wall shall be reinforced with four (4) inch by twelve (12) inch bonded pilasters at all main girder bearings.

112.42. Closure Blocks.—All open cells in tiles or blocks at wall ends and at wall openings shall be filled solidly with concrete or its equivalent for a length of wall of not less than twelve (12) inches or reversed closure tile shall be used.

112.43. Cavity Walls.—Approved flashing shall be provided around all openings and drainage pipes or other protection shall be provided to prevent water from accumulating in the cavity. During construction, precautions shall be taken to prevent mortar droppings from obstructing and filling the cavity. All openings in cavity wall construction shall be provided with perimeter ties as specified in section 112.33 between the two wythes at not more than three (3) feet centers on all sides.

112.44. Transition in Wall Thickness.—When walls of hollow masonry are decreased in thickness, the top course units of the lower thicker wall shall be filled solidly for not less than four (4) inch depth with concrete, or such course shall be covered with solid tile slabs not less than one (1) inch in thickness, or with brick or other approved masonry not less than two (2) inches thick.

112.5. Chases and Alcoves.

112.51. Size Limitations.—The maximum permitted depth of a chase shall be not more than one-third (⅓) the wall thickness and the maximum length of a horizontal chase or maximum horizontal projection of a diagonal chase shall not exceed four (4) feet; except that the length of the apron below window sills in all walls may equal the width of the window opening and such aprons in eight (8) inch walls may be chased not more than four (4) inches in depth when waterproofed to comply with section 116.45.

112.52. Alcoves.—Recesses for alcoves, elevators, dumbwaiters, and stairways and for similar purposes shall have not less than eight (8) inches of masonry at the back.

112.53. Lintels over Chases.—When the length of a chase in bearing walls is more than twelve (12) inches, lintels shall be provided to support the masonry above the chase. All chases shall be built to have not less than eight (8) inches of approved masonry at the jambs of openings.

112.54. Hollow Walls.—Chases and recesses in hollow walls and walls constructed of hollow blocks or tiles shall be built in with the wall; and no chases shall be cut in such walls after erection.

112.55. Cutting Fire Walls.—No masonry walls of a required fire-resistance rating, which are eight (8) inches or less in thickness shall be cut for chases or socketed for insertion of structural members subsequent to erection.

112.6. Structural Members, Buttresses and Piers.

112.61. Lintels and Arches.—All openings in masonry walls shall be spanned by plain or reinforced arches, steel lintels or other approved noncombustible supports with not less than four (4) inch bearing on the wall at each end on bearing plates of metal not less than one-half (½) inch thick or of natural or reinforced artificial stone not less than four (4) inches thick. Plain stone lintels shall not be used on spans greater than four (4) feet nor to support load concentrations on the wall less than two (2) feet above the top of the lintel unless supplemented by structural lintels or arches. All lintels shall be of sufficient strength to support the superimposed load with a deflection of not more than one three-hundred-and-sixtieth (1/360) of the clear span; and arches shall be designed to support the load with provision to resist the lateral thrust.

112.62. Buttresses and Piers.—All wall buttresses and piers shall be built into the wall with a masonry bond. Isolated piers shall be not less than twelve (12) inches square nor more than twelve (12) times the least dimension in height when of solid masonry construction nor more than four (4) times the least dimension when of hollow masonry unless filled solidly with approved concrete. Isolated masonry piers shall be bonded as required for solid walls of the same thickness and shall be provided with a cap stone or bearing plate of the full dimension of the pier or with other adequate means for distributing the load on the top.

112.63. Bearing and Anchorage of Structural Members.—All structural beams and girders producing concentrated loads shall have a bearing on solid masonry of not less than four (4) inch thickness and shall project not less than four (4) inches into masonry walls with adequate wall-bearing plates as provided in section 112.61. All such beams and girders shall be anchored to the masonry with standard steel anchors.

112.7. Corbeling and Projecting Masonry.

112.71. Limiting Projections.—No masonry wall less than twelve (12) inches thick shall be corbeled except to support firestopping around combustible floor framing and as provided for foundation walls in section 110.6. The support of chimneys shall conform to section 113.15. The maximum horizontal projection of corbels shall be not more than one-third (⅓) the thickness of the wall nor shall the projection of any single course of masonry exceed one-third (⅓) the height of the masonry unit.

112.72. Hollow Walls.—Corbeling of hollow masonry or masonry built of hollow units shall be supported on one full course of solid masonry not less than twelve (12) inches deep.

112.8. Cornices and Exterior Trim.

112.81. Cornice Construction.—All cornices except on buildings of frame construction outside the fire limits shall be constructed of metal covered wood or other approved noncombustible materials secured to the wall with noncombustible anchors and brackets. Terra cotta, metal and molded cornices shall be installed with a structural frame anchored and supported to resist the overturning moment due to the loads specified in section 109. When exterior cornices of wood or other combustible construction are permitted they shall be firestopped at maximum intervals of twenty (20) feet. If non-continuous, they shall be closed solidly at the ends with at least four (4) inch separation between adjoining sections; and if continuous, noncombustible firestops shall be provided at the lot lines complying with section 119.9.

112.82. Balconies and Bay Windows.—All balconies, bay and oriel windows attached to or supported by walls of other than frame construction shall be constructed of approved noncombustible materials with brackets and supports of steel, concrete or other approved noncombustible materials.

112.83. Half-Timbering.—Exterior half-timbering and other architectural decorative trim erected on the face of masonry enclosure walls may be constructed of wood and similar combustible materials on all buildings within the scope of this code when backed up solidly with noncombustible materials.

112.84. Existing Combustible Trim.—Any existing cornice or other decorative elements constructed of wood or other combustible material where prohibited by the provisions of this code may be repaired with the same material, but such repairs shall not exceed fifty (50) per cent of the area of such prohibited construction in any one year.

112.9. Lateral Bracing of Walls and Erection Precautions.—All masonry bearing walls shall be laterally supported by horizontal bracing of floor and roof framing or by vertical bracing of columns, piers, buttresses or crosswalls at the intervals herein specified. In non-bearing enclosure, partition or fire division walls, the intervals between lateral bracing may be increased fifty (50) per cent above the specified limits.

112.91. Vertical and Horizontal Intervals.—The interval between horizontal or vertical bracing of masonry bearing walls shall be not more than twenty (20) times the wall thickness in walls of solid masonry; eighteen (18) times the wall thickness in hollow walls and walls of hollow units; and fourteen (14) times the wall thickness in cavity wall construction.

112.92. Maximum Unbraced Length.—In no case shall the length of bearing or non-bearing walls between columns, piers, buttresses, crosswalls or other equivalent vertical bracing be more than seventy-five (75) times the wall thickness.

112.93. Temporary Bracing.—Whenever practical, masonry enclosure walls shall be carried up together and shall be temporarily braced during erection where necessary.

112.94. Anchorage of Beams.—All wood floor beams, joists and roof rafters resting on masonry walls shall be anchored with not less than one-eighth by one by sixteen (⅛ x 1 x 16) inch metal anchors with split and upset ends at maximum intervals of six (6) feet in one- and two-family dwellings and not more than four (4) feet on centers in all other buildings. Masonry walls parallel to beams or joists shall be provided with anchors which engage not less than three (3) beams or joists at maximum intervals of eight (8) feet in one- and two-family dwellings and not more than six (6) feet in all other buildings.

112.95. Intersecting Walls.—The intersection of two (2) walls shall be bonded by not less than fifty (50) per cent of the masonry units when the two walls are laid together; and when carried up separately, the intersection shall be toothed with eight (8) inch maximum offsets and tied together with approved spear anchors at vertical intervals of not more than four (4) feet.

112.96. Erection Precautions.—All masonry shall be protected against freezing for not less than forty-eight (48) hours after installation and shall not be constructed below twenty-eight (28) degrees F. on rising temperatures or below thirty-six (36) degrees F. on falling temperatures without temporary heated enclosures or without heating materials or other approved precautions necessary to prevent freezing. No frozen materials shall be used or shall frozen materials be built upon. In warm weather all clay or shale units of high absorption characteristics shall be thoroughly wet before laying in the wall. All other masonry units, except gypsum units, laid in other than lime mortar, shall be wetted before laying in the wall if the absorption resulting from partial immersion in one-eighth (⅛) inch of water for one (1) minute is less than one (1) per cent.

SECTION 113.0. CHIMNEYS, FLUES, VENTS AND SMOKEPIPES

All chimneys, flues, vents and smokepipes for the removal of the products of combustion hereafter erected or altered in all buildings and structures shall comply with the provisions of this section; except that minor repairs for the purpose of maintenance and upkeep which do not increase the capacity of the heating apparatus or appliances or which do not involve structural changes in the permanent chimney, flues or vents may be made without a permit.

113.1. Solid and Liquid Fuel-Fired Equipment.—Chimneys, flues and smokestacks for all solid and liquid fuel-fired heating equipment or appliances when constructed of solid masonry, reinforced concrete, metal or other approved noncombustible materials shall conform to the following requirements. When lining is required, it shall comply with section 113.2.

113.11. Solid Masonry.—Except as herein provided for dwellings and small business buildings, the walls of masonry chimneys and flues shall be not less than eight (8) inches thick when constructed of brick, stone or mass concrete; and except further that the building official may approve such flues with four (4) inch walls when the cross-sectional area is not greater than fifty-seven (57) square inches in one-story buildings for business and storage use of low fire hazard.

113.12. Reinforced Concrete.—Except in dwellings, the walls of chimneys and flues shall be not less than six (6) inches thick when constructed of reinforced concrete.

113.13. Dwellings.—In one- and two-family dwellings and multi-family dwellings, chimney and flue walls may be constructed of solid masonry or reinforced concrete not less than four (4) inches thick when the area of the flue is not more than two hundred (200) square inches and the flue is provided with a fire clay lining; or such chimneys in one- and two-family dwellings may be erected of the alternate construction specified in section 113.2. All flue walls that are less than eight (8) inches thick shall be lined to comply with section 113.17 and smoothly parged or stuccoed on the outside so as to be gas- and weather-tight within the building, or the flue walls within the building shall be eight (8) inches thick.

113.14. Metal Smokestacks.—Exterior metal smokestacks shall be not less than one-eighth (⅛) inch thick for diameters up to three (3) feet and three-sixteenths (3/16) inch thick for diameters up to four (4) feet. Interior metal smokestacks shall be constructed of metal not less than No. 16 U.S. gage for areas up to one hundred and fifty-four (154) square inches, No. 14 U.S. gage for areas not more than two hundred (200) square inches, No. 12 U.S. gage for areas not more than two hundred and fifty-four (254) square inches and not less than No. 10 U.S. gage for greater areas. All metal smokestacks shall be galvanized or painted with an approved paint, or shall be constructed of corrosion-resistive metals or steel alloys. All such stacks shall be securely guyed, braced, anchored and supported.

113.15. Support of Masonry Chimneys and Smokestacks.—All masonry chimneys and smokestacks shall rest on a foundation located on permanently undisturbed soil or shall be supported on fireproof construction; and no chimney shall rest on or be hung or otherwise supported from combustible floor or wall construction; except as provided in section 113.2. Chimneys may be corbeled from masonry walls other than hollow or cavity wall construction or walls built of hollow masonry units; provided such corbels do not exceed the limits specified in section 112.7. Metal smokestacks erected on the exterior of a building or structure shall be supported on independent substantial masonry or reinforced concrete foundations. Interior smokestacks may be supported on fireproof construction at intermediate floor levels. Masonry chimneys erected outside of frame dwellings shall be anchored to the stud walls at each floor level or at vertical intervals of not more than ten (10) feet.

113.16. Clearances.—Combustible construction shall be trimmed away from all flues and chimneys as specified in section 111.91. Every exterior metal smokestack shall have a clearance of not less than twenty-four (24) inches from frame wall construction unless insulated with not less than two (2) hour fire-resistive construction. All interior metal smokestacks shall be enclosed with walls of not less than two (2) hour fire-resistive construction. Where such interior stacks pass through a combustible roof, it shall be guarded with a metal ventilating thimble extending not less than nine (9) inches above and below the roof with a clearance of not less than twelve (12) inches on all sides of the stack, unless insulated to prevent a temperature greater than two hundred and fifty (250) degrees F. on the exterior exposed surface.

113.17. Linings.—Masonry chimneys with walls less than eight (8) inches thick shall be lined with approved flue linings to comply with section 113.33. Medium and high temperature chimneys and stacks as defined in article 10 of the Basic Building Code shall be lined with four and one-half (4½) inches of fire brick, for the entire height from a point two (2) feet below the inlet opening, or shall be of double wall construction with an intervening air space of not less than two (2) inches. All flue linings shall be supported on solid brick offset or on foundations below the bottom of the cleanout.

113.18. Cleanouts.—Cleanouts or other approved devices shall be provided at the base of all chimneys and metal smokestacks to enable the flues to be maintained clean.

113.19. Chimney Sizes.—Only one (1) inlet shall be permitted in a flue eight by eight (8 x 8) inches nominal size or smaller, or with a cross-sectional area of less than seventy-four (74) square inches. The size of the flue shall be proportionately increased for a larger number of inlets. For flues larger than one hundred and twenty (120) square inches, the walls shall be not less than eight (8) inches thick, except as provided in section 113.13. No change in the size or shape of a chimney shall be made within six (6) inches of the roof framing through which it passes.

113.2. Alternate Chimney and Vent Construction.

113.21. Solid and Liquid Fuel-Fired Equipment.—In lieu of masonry chimneys in one- and two-family dwellings for solid and liquid fuel-fired equipment, chimney assemblies of approved acid-, weather- and heat-resisting materials may be constructed as herein provided. Such assemblies shall be designed and constructed so as to prevent a temperature greater than two hundred and fifty (250) degrees F. on the exterior exposed surface. All combustible construction shall be maintained with a clearance of not less than two (2) inches from the outside surface of the insulation. Chimney assemblies tested and approved by accredited authoritative agencies which meet the requirements of this code shall be accepted for use with solid and liquid fuel-fired equipment.

113.22. Gas Fuel-Fired Equipment.—In lieu of masonry construction, chimneys in one- and two-family dwellings for flues and vents from gas-fired appliances may be constructed with a lining of approved corrosion-resistive materials enclosed in an insulating wall of acid- and heat-resisting metal. The enclosure shall be so constructed and designed as to prevent a temperature greater than two hundred and fifty (250) degrees F. on the exterior exposed surface. Clearances shall be maintained from combustible construction as provided in section 113.21. Flue assemblies which have been tested and approved by accredited authoritative agencies and which meet the requirements of this code shall be accepted for use with gas-fired heating equipment.

113.23. One- and Two-Family Dwellings.—In one- and two-family dwellings which are not more than two (2) stories and attic in height, alternate chimney construction as herein described may be supported on concrete-filled pipe columns or may be hung from attic or ceiling joists of adequate strength protected with component materials to afford a fire resistance of not less than three-quarter (¾) hour, provided all clearances are maintained as specified in this code and the vents are supported on corrosion-resistive metal brackets of not less than No. 16 U.S. gage.

113.3. Flue Construction and Lining.—All heating equipment except electric and gas-fired appliances, specifically exempted by the provisions of section 113.5, shall be connected by smokepipes or breeching to flues which conform to this section.

113.31. Labeling Flues.—Flues installed for the use of gas appliances which are not suitable for solid or liquid fuel-fired equipment shall be plainly and permanently labeled to that effect.

113.32. Existing Flues.—No existing flue which does not conform to all the requirements of this section shall be continued in use unless it does not endanger the fire safety of the building and is acceptable to the building official.

113.33. Flue Linings.—Flue linings shall be made of fire clay or other approved refractory materials with a shell thickness of not less than five-eighths (⅝) inch capable of resisting the action of flue gases at a temperature of not less than two thousand (2000) degrees F. without softening or cracking. The flue lining shall start not less than eight (8) inches below the inlet of the smokepipe or the throat of a fireplace and shall extend not less than four (4) inches above the top of the chimney; except that when no masonry division is provided between flues, the flue linings shall extend to the bottom of the cleanout.

113.34. Number and Size.—Not more than two (2) flues shall be enclosed in a single chimney unless separated by not less than four (4) inches of masonry or reinforced concrete bonded into the chimney walls. When not so separated, the bed joints of the flue linings shall be staggered not less than seven (7) inches. The cross-sectional area of flues shall be not less than specified in table 14.

Table 14.—Minimum Sizes of Flues

Type of equipment	Cross-sectional area in square inches
Small space stove or heater	27
Stove, range or room heater	35
Fireplace (not less than 1-12 fireplace opening)	57
Hot water and low pressure steam boiler	57
Bakery oven with venting ca pacity of a nominal 8″ by 12″ standard tile-lined 4″ brick chimney and similar equipment	120

113.4. Height of Chimneys and Smokestacks.

113.41. Masonry Chimneys.—Chimneys and flues shall extend not less than three (3) feet above the adjacent roof and not less than two (2) feet above any roof ridge within a horizontal distance of ten (10) feet. They shall be capped with concrete, terra cotta tile or other approved noncombustible and weatherproof materials. If the height above the roof exceeds four (4) times the minimum dimension, the chimney shall be braced and anchored to the roof framing.

113.42. Metal Smokestacks. All metal smokestacks shall extend to a height of not less than four (4) feet above any roof within a horizontal distance of twenty (20) feet; except that smokestacks from cupola, blast and similar industrial furnaces shall extend not less than twenty-five (25) feet above any roof within a radius of fifty (50) feet and shall be covered with a spark arrestor complying with section 113.93.

113.5. Gas-Fired Equipment.—All gas-fired equipment including boilers, furnaces, incinerators and all appliances which produce flue temperatures under normal operation more than six hundred (600) degrees F. at the outlet of the draft hood when burning gas at the manufacturer's input rating, or which can be readily converted to the use of solid or liquid fuels shall be provided with chimneys, metal smokestacks or flues as specified in sections 113.1 and 113.2. The room in which gas equipment of any kind is installed shall be adequately ventilated to comply with section 114.41.

113.51. Vents for Gas Fuel and Electric Appliances.—Flue or vent connections shall not be required for electric and gas appliances of such size or character that no hazard to the fire and health safety of the building or its occupants would result from the absence of such connection. All other approved gas appliances of the input ratings herein specified shall be vented to the outer air with approved vents of noncombustible corrosion-resistive material of adequate strength and heat resisting value:

All domestic appliances with a rating in excess of fifty thousand (50,000) B.T.U. per hour other than manually controlled cooking ranges, or when equipped with automatic means for shutting off the gas supply to one or more burners, or when equipped with automatic means for turning on the gas supply to one or more burners when such burners are furnished with automatic ignition and an automatic pilot;

All automatically controlled appliances with a rating in excess of five thousand (5000) B.T.U. per hour; except when equipped with controls which cannot automatically reduce the gas supply to less than thirty (30) per cent of the peak demand;

All automatically controlled appliances with a rating of five thousand (5000) or less B.T.U. per hour equipped with an automatic pilot; except instantaneous water heaters which supply water to one integral faucet and other automatic appliances equipped with controls as herein specified;

All multiple appliances which, if not vented, have an aggregate input rating of thirty (30) B.T.U. per hour or more per cubic foot room volume, other than domestic gas ranges;

All room or space heaters installed in sleeping quarters for transients other than heaters with a sealed combustion chamber and direct air supply for complete combustion from the outside and direct discharge of all products of combustion to the outside; and

All gas-fired incinerators.

113.52. Size of Vents.—The cross-sectional area of a flue or vent for gas-fired appliances shall be not less than one (1) square inch for each seventy-five hundred (7500) B.T.U. per hour input; nor shall the internal area of the flue or vent be less than the internal area of the largest vent connection. Rectangular or oval vents shall have an area of not less than twelve (12) square inches and the diameter of a round flue shall be not less than three (3) inches. For rough brick-lined flues, the design capacity shall be increased fifteen (15) per cent.

113.53. Draft Hood.—Every flue-connected gas appliance, except an incinerator, shall be equipped with an effective draft hood installed in accordance with the manufacturer's directions, or integrally incorporated in the construction of the equipment.

113.54. Dampers.—No manually operated damper shall be placed in any vent connection to a flue and the vent pipe shall be pitched toward the appliance at not less than one-quarter (¼) inch to the foot of horizontal projection.

113.6. Vent and Duct Construction.

TABLE 15.—METAL DUCT AND VENT CONSTRUCTION, OTHER THAN DWELLINGS

Diameter, or diagonal of rectangular ducts, dimension in inches	Minimum thickness	
	Galvanized Steel U. S. gage number	Aluminum B & S gage number
Up to 12	28	26
12-20	26	24
20-30	24	22
30-48	22	20
48-60	20	18
60-90	18	16
90 and over	16	14

113.61. Gas Appliance Vents.—Vents for gas-fired appliances shall be constructed of galvanized steel, cement-asbestos, metalbestos, fire-clay or

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other approved corrosion-resistive, noncombustible materials for the temperatures involved with tight joints as herein provided; and shall comply with the minimum thicknesses herein specified for ducts and vents in tables 15 and 16.

113.62. Ducts in One- and Two-Family Dwellings.—Warm air supply ducts in heating and air conditioning systems of one- and two-family dwellings shall be constructed of aluminum, copper, galvanized steel or other approved noncombustible materials of equal strength and durability to the material specified in table 16.

TABLE 16.—DUCTS FOR DWELLINGS

Diameter, or diagonal of rectangular ducts, dimensions in inches	Minimum thickness and weight		
	Tin weight per square in pounds	Galvanized steel U. S. gage number	Aluminum B & S gage number
Up to 12	IC 107	30	26
12-18	IX 135	28	26
18 and over	IX 135	26	24

113.63. Types of Gas Vents.—Type A vents shall be constructed the same as masonry flues or metal smokestacks for use with boilers, warm air furnaces and incinerators unless special approval is granted by the building official for a type B vent.

Type B vents shall be constructed of noncombustible, corrosion-resistive materials sufficient to prevent a temperature of not more than two hundred and fifty (250) degrees F. on adjacent construction and when approved by accredited authoritative agencies for use with gas-fired appliances which produce flue gas temperatures not more than five hundred and fifty (550) degrees F. at the outlet of the draft hood.

Type C vents shall be constructed of not less than No. 24 U.S. gage sheet copper or No. 20 U.S. gage galvanized steel or of other approved noncombustible corrosion-resistive materials of equivalent strength and durability for use in vent pipes which pass directly through the roof or exterior wall to the outer air. Such flues shall not pass through any attic or other concealed space nor through any intermediate floor construction.

113.64. Fire-Clay Vents.—Fire-clay vent pipes shall have a thickness of not less than one-half (½) inch for an internal diameter of less than six (6) inches and three-quarter (¾) inches for an internal diameter of six (6) or more inches. The joints shall be made tight with bell and spigot, sheet metal sleeves, or galvanized iron bands of not less than No. 26 U.S. gage, thoroughly secured and cemented in place with high temperature cement mortar.

113.65. Clearances and Protection.—No gas-appliance vent shall pass through an attic, concealed space, combustible floor or roof, wall or partition unless constructed as herein provided. Such vents shall be fitted with a ventilating collar or double thimble with the annular space filled with approved noncombustible insulating material. A clearance of not less than one (1) inch shall be maintained from all combustible construction when plastered and not less than two (2) inches when unplastered; except that a vent from a floor furnace, water heater or space heater shall have a clearance of not less than three (3) inches for a distance of not less than three (3) feet from the outlet of the draft hood. All vents shall be enclosed in one-quarter (¼) inch asbestos or three-eighth (⅜) inch gypsum boards where they pass through habitable spaces.

A vent of not less than No. 20 B & S gage aluminum, 16-ounce sheet copper, No. 26 U.S. gage monel metal or of not less than No. 20 U.S. gage galvanized iron may be used from rooms or spaces in which a gas-fired heating appliance is located, extending directly through the roof or through the exterior wall to the outer air, provided it does not pass through an attic, concealed space, or partition.

113.66. Connections and Bracing.—All seams in vents shall be made substantially air and gas tight; and the vents shall be supported on substantial, corrosion-resistive metal brackets or hangers of not less than No. 16 U.S. gage and shall be braced at not more than five (5) foot intervals.

113.67. Duct Systems.—All ducts and duct systems required for warm air heating and air-conditioning systems under the provisions of sections 114 and 118 of this code shall be constructed of similar materials approved for vents, at least equivalent in strength and durability to the minimum thickness of galvanized steel specified in tables 15 and 16. They shall comply with the requirements of section 118.9 in respect to fire doors, dampers, fresh air inlets, outlets and air filters.

113.68. Hot Air Ducts.—Hot air ducts in proximity to combustible materials shall be sufficiently insulated to prevent temperatures of more than two hundred and fifty (250) degrees F. on the exterior surface. All exterior insulation of high temperature hot air ducts which carry air at a temperature of more than two hundred (200) degrees F. shall be of noncombustible materials. All interior insulation of ducts shall be noncombustible. For a distance of six (6) feet from the furnace, the clearance of a metal duct from combustible material shall be the same as that required for the furnace clearance in section 114. Where such ducts enter walls, floors or partitions within six (6) feet, they shall be enclosed in fire-resistive assemblies of not less than three-quarter (¾) hour fire-resistance rating. Banks of vertical ducts or pipes which pass through two (2) or more stories in other than one- and two-family dwellings shall be enclosed in shafts of not less than three-quarter (¾) hour fire-resistive construction. Cement asbestos ducts shall have a clearance of not less than one-eighth (⅛) inch from combustible construction. When ducts pass through walls or partitions, the required clearance shall be maintained by a metal thimble filled with approved noncombustible, insulating materials, or the opening shall be closed at both ends with metal collars, firestopped as required in section 119.9.

113.69. Cold Air Ducts.—The construction of cold air ducts shall comply with all the provisions governing warm air ducts except in respect to heat insulation and clearance from combustible construction.

113.7. Smokepipes and Connections.—The smokepipe or breeching from solid and liquid fuel-fired heating appliances shall be constructed of galvanized iron, or other corrosion-resistive metals, or of approved masonry. No tile pipe shall be used as a smokepipe.

113.71. Chimney Connection.—Smokepipes shall enter the side of the chimney through a fire-clay or metal thimble or flue ring of masonry. They shall not project beyond the inner face of the flue. Two smokepipes may be joined to a single flue connection provided that the smokepipe and flue are of sufficient aggregate size to serve all of the appliances thus connected. No smokepipe of a heating appliance shall be connected to an incinerator flue.

113.72. Thickness of Metal.—The thickness of metal smokepipes shall be not less than specified in table 15 for duct and vent construction.

113.73. Length of Smokepipe.—Smokepipes shall be as short and straight as possible consistent with use and draft conditions.

113.74. Clearances.—Unless covered on the outside with one (1) inch of asbestos insulation or other approved noncombustible materials, the following clearances shall be maintained from all combustible materials and construction:

Diameter Inches	*Clearance Inches*
0 — 12	12
12 — 36	20
More than 36	36

The specified clearances may be reduced one-half (½) when an approved metal or other noncombustible enclosing shell is installed so as to provide a continuous one (1) inch ventilating air space around the smokepipe with access openings for inspection purposes; or the exposed combustible construction shall be protected with noncombustible materials as provided in table 17.

113.75. Thimbles.—No smokepipe shall pass through a floor, roof or ceiling construction. Where such smokepipes pass through combustible walls or partitions, they shall be protected with approved thimbles firestopped with noncombustible materials; or the partition shall be constructed of noncombustible materials with not less than three-quarter (¾) hour fire resistance for a distance corresponding to the clearances specified in section 113.74.

113.8. Fireplaces.—The backs and jambs of fireplaces shall be not less than eight (8) inches thick of solid masonry or reinforced concrete with a lining of fire brick, soapstone, cast iron, or other approved noncombustible material not less than two (2) inches thick; except that such lining may be omitted when the wall construction is not less than twelve (12) inches thick or the equivalent insulation and protection is provided integrally in the approved heating equipment or firing device. In one- and two-family dwellings, when approved steel fireplace units which are equipped with an air circulating chamber are installed integrally with the fireplace construction, the backs and jambs of the fireplace may be reduced to four (4) inches of approved masonry.

113.81. Hearth.—Every fireplace shall be constructed with a hearth of brick, stone, tile or other noncombustible material which extends not less than twenty (20) inches in front of and not less than eight (8) inches on each side of the fireplace opening. Such hearth shall be supported on trimmer arches of brick, stone, tile or concrete not less than four (4) inches thick, or other equally strong and fire-resistive materials.

113.82. Fireplace Heaters.—No heater shall be installed in a fireplace unless it is provided with a flue conforming to this code; except an electric appliance or a gas appliance exempted from vent requirements under the provisions of section 113.51.

113.83. Imitation Fireplaces.—The depth of an imitation fireplace or recess for heating equipment shall be not more than six (6) inches unless such recess meets all the requirements for fireplaces. The surface of the recess shall be of masonry or fire-resistive plaster and all combustible materials shall have the clearances specified in sections 111.9 and 119.97. No flue other than an approved gas vent shall be installed within such imitation fireplace.

113.9. Incinerators and Spark Arrestors.—All incinerators, other than portable domestic incinerator units of less than two (2) square feet grate area, and gas-fired incinerators of not more than four (4) bushel capacity, constructed as an integral part of the building structure shall comply with the requirement of this section.

113.91. Non-Fuel-Fired.—When the grate area of an incinerator is not more than nine (9) square feet, the flue shall be enclosed with not less than four (4) inches of brick or reinforced concrete masonry, lined with fire-clay flue lining. When the grate is more than nine (9) square feet in area, the flue lining shall be not less than four and one-half (4½) inches of fire brick.

113.92. Fuel-Fired Incinerators.—Flues for all fuel-fired incinerators shall be constructed as required for non-fuel-fired incinerators of over nine (9) square feet grate area.

113.93. Spark Arrestors.—Non-fuel-fired incinerator chimneys and all other chimneys or flues which emit sparks, such as foundry chimneys and appliances in which sawdust, shavings or wood are burned shall be provided with a spark arrestor of approved noncombustible construction with maximum mesh openings of three-quarter (¾) inch. The total effective open area of such spark arrestor shall be not less than four (4) times the flue area.

SECTION 114.0. HEATING EQUIPMENT, MOUNTING AND INSTALLATION

The provisions of this code are limited in application to heating appliances fired with solid, liquid or gas fuels in which the products of combination will result in sustained flue gas temperatures of not more than one thousand (1000) degrees F. under normal operating conditions; or a steam boiler operated at fifty (50) pounds per square inch or less gage pressure; or a steam boiler of not over ten (10) boiler horse power, regardless of operation pressure, or any equipment otherwise classified as a medium heat appliance but not larger than one hundred (100) cubic feet in size; and to gas and fuel oil fired heating appliances. The installation of heating appliances which operate at higher temperatures and pressures and industrial and power boilers shall be governed by the Basic Building Code. No permit shall be required for the installation, alteration, extension or removal of a heating boiler or furnace in a one- or two-family dwelling nor for any heating furnace which burns less than fifteen (15) pounds of anthracite per square foot of grate surface per hour, nor for gas ranges, space heaters or similar domestic gas appliances.

114.1. Furnace and Boiler Foundation Mountings.—Except otherwise specifically provided for the installation of approved gas and oil-fired furnaces, stoves and ranges on combustible floors, furnaces and boilers shall be mounted on the ground or on a foundation constructed of masonry, concrete or other approved noncombustible materials with the fire-resistance herein specified, extending not less than twelve (12) inches beyond the appliance on all sides.

114.11. Approved Heating and Cooking Appliances.—Approved gas and oil-burning warm air furnaces, oil-burning floor furnaces, gas-fired unit heaters, domestic incinerators and gas and oil-burning stoves and ranges inspected and approved by the accredited testing authorities listed in appendix A and contained in the published listings of such nationally recognized testing agencies shall be accepted by the building official when installed with the reduced clearances and details of installation therein recommended, provided they meet the requirements of this code for insulation. Gas-fired and electric heating and cooking ranges and other approved domestic heating and cooking appliances mounted on legs as provided in this section, or constructed with equivalent integral protection may be erected directly on wood floors or other construction of similar combustible characteristics.

114.12. Water-Cooled Base.—A boiler which has a grate area of less than three (3) square feet with a water-cooled base in which the water jacket extends under the whole of the ash pit and fire box or under the entire fire chamber when there is no ash pit, or in which the combustion chamber is not less than twelve (12) inches above the floor may rest directly on a sheet metal base of not less than No. 14 U.S. gage steel on combustible construction without masonry insulation.

114.2. Floor Clearances.—When an air space is provided between the boiler or furnace and combustible construction, protection shall be provided as herein required:

114.21. House Heating Appliances.—When heating boilers and furnaces that are mounted on legs which provide an open ventilated space of not less than four (4) inches in height under the base, the floor shall be protected with not less than one-quarter (¼) inch mill board covered with sheet metal of not less than No. 24 U.S. gage which shall extend not less than six (6) inches beyond the appliances and not less than eighteen (18) inches where ashes are removed.

114.22. Tile Masonry Mounting.—When heating boilers and furnaces are not mounted on legs, the floor shall be protected with four (4) inches of hollow clay or concrete tile covered with No. 24 U.S. gage sheet metal with eighteen (18) inch extension for ash removal. The tile shall be laid with ends unsealed and joints notched to provide through circulation of air.

114.23. Domestic Appliances.—When domestic heating and cooking appliances are mounted on legs which provide an open ventilated space not less than eighteen (18) inches in height under the base, or which have no burners, oven or broiler within eighteen (18) inches of the floor, no special floor protection shall be required provided there is at least one (1) metal baffle between the burners and floor.

114.24. Four-Inch Clearance.—When domestic heating and cooking appliances are mounted on legs which provide an open ventilated space not less than four (4) inches in height under the base, the floor shall be protected with sheet metal of not less than No. 24 U.S. gage or other approved noncombustible material. When solid fuel-fired, the protection shall extend not less than eighteen (18) inches on sides where ashes are removed.

114.25. Restaurant Appliances.—When floor mounted ranges, ovens and similar hotel and restaurant-type appliances are mounted on legs which provide an open ventilated space of not less than eighteen (18) inches in height under the base or which have no burners, oven or broiler within eighteen (18) inches of the floor, no special floor protection shall be required provided there is at least one (1) metal baffle between burners and floor.

114.26. Eight-Inch Clearance.—When hotel and restaurant-type appliances are mounted on legs which provide an open ventilated space of not less than eight (8) inches in height under the base, the floor shall be protected with not less than three-eighth (⅜) inch mill board covered with No. 24 U.S. gage sheet metal.

114.27. Four-Inch Clearance.—When hotel and restaurant-type appliances are mounted on legs which provide an open ventilated space of not less than four (4) inches in height under the base, the floor shall be protected with not less than a single layer of hollow clay or concrete tile covered with No. 24 U.S. gage sheet metal.

114.28. Double Tile Mounting.—When restaurant-type appliances are not mounted on legs, the floor under the appliance shall be not less than three-quarter (¾) hour fire-resistive noncombustible construction, protected with a double-tile course covered with No. 24 U.S. gage sheet metal.

114.29. Canopy Hood.—Unless enclosed and vented in an approved manner, restaurant ranges, candy kettles, cruller, bakery and confectionery furnaces and similar appliances generating hot or noxious gases and smoke shall be installed with a ventilating hood with ducts to the outer air. The hood shall be located not more than seven (7) feet above the floor and shall completely cover the appliance served with a clearance of not less than eighteen (18) inches from any combustible material or construction. The hood and ducts shall be constructed of metal or other approved noncombustible material with tight joints and shall connect to an independent smoke flue or metal smokestack complying with section 113. Such hood and ducts shall be equipped with a grease screen or filter to prevent the accumulation of grease or other flammable material in the duct and flue to which it is connected. The grease screen shall be cleaned periodically and replaced when necessary.

114.3. Wall and Ceiling Clearances and Protection.—All solid and liquid fuel-fired heat appliances shall be installed so as to have clearances from wood or other combustible materials or construction of not less than eighteen (18) inches at the top, sides and rear, and not less than forty-eight (48) inches at the front. These clearances may be decreased when the exposed construction is protected to afford the fire resistance specified in table 17, or the equivalent protection is secured by an approved arrangement of plates and baffles; or when the appliances are insulated on the exterior with approved masonry, or are jacketed with an intervening air space, or by special approval after test of a particular type of construction or equipment.

Table 17.—Reduced Wall and Ceiling Clearances

Fire resistance of protected construction	Fraction of specified clearances	
	Top	Sides and rear
⅓-hour	seven-eighths	five-eighths
½-hour	three-quarters	one-half
¾-hour	five-eighths	three-eighths
1-hour	one-half	one-quarter

114.31. Clearance Variations.—House heating appliances, domestic-type ranges and space heaters may be installed with modified clearances as herein specified from combustible materials:

	Clearance in Inches			
	Top	*Side and Rear*	*Front*	*Smoke-pipe*
Heating boilers and furnaces when water or masonry jacketed	6	6	48	18
When jacketed with 1½″ asbestos cement	9	6	48	18
Mechanical warm air with 250° F. temperature limit control	6	6	48	18
Domestic ranges and stoves	36	18	36	18
Ranges and stove with fire clay lining	24	18	24	18
Space heaters	36	18	36	18
Water heaters	12	12	12	18

Labeled heating appliances which are approved for installation with lesser requirements than herein provided may be installed in accordance with the conditions of such approval.

114.32. Basement Ceiling Protection.—In one- and two-family dwellings, basement ceilings over all heating equipment shall be protected for a distance of not less than three (3) feet on all sides of heating equipment with not less than No. 16. U.S. gage sheet metal, one-eighth (⅛) inch asbestos mill board or three-sixteenth (3/16) inch asbestos lumber, except when the entire ceiling is constructed of three-quarter (¾) hour fire resistance.

114.33. Solid and Liquid Fuel-Fired Equipment.—In other than one- and two-family dwellings, all steam boilers, heating furnaces and water heating apparatus using any fuel other than gas shall be enclosed in walls and ceiling of not less than two (2) hour fire-resistive construction with a three-quarter (¾) hour fire door. The floors shall be constructed of concrete or other fire-resistive assemblies of not less than two (2) hour fire-resistance rating. Where required under the provisions of the Basic Building Code in public garages, high hazard and other special uses, such boiler rooms shall be completely enclosed in not less than two (2) hour fire-resistive construction with openings to the outside only.

114.34. Gas-Fired Appliances.—Except when the equipment is insulated by the manufacturer to prevent the transmission of temperatures in excess of two hundred and fifty (250) degrees F., gas ranges or gas water heaters shall not be placed nearer than twelve (12) inches to unprotected wood or other combustible material or nearer than six (6) inches if protected with No. 20 U.S. gage metal with an intervening one (1) inch air space, or protected with not less than one (1) inch of clay tile or three-quarter (¾) inch of plaster on metal lath. Gas grates and gas logs when not installed in a fireplace or recess complying with section 113.8 shall have a clearance of not less than ten (10) inches to unprotected wood or other combustible materials unless insulated as required for gas ranges. Gas water heaters placed in a recess shall have not less than six (6) inch clearances on all sides of the heater; and the recess shall be completely lined with not less than three-quarter (¾) hour fire-resistive construction.

114.35. Gas Vent Connectors.—Vent connectors shall be constructed of approved metal, terra cotta, cement, glazed sewer, asbestos cement or other corrosion-resistive, noncombustible materials of sufficient thickness and low heat conductivity to withstand damage. Copper pipe shall be of not less than sixteen (16) ounce copper, monel metal of not less than No. 26 U.S. gage and galvanized steel or Alleghany iron of not less than No. 28 U.S. gage. The vent connector shall provide a rise of not less than one-quarter (¼) inch to the horizontal foot from the appliance to the flue or vent. When a horizontal run is necessary, the length shall not exceed seventy-five (75) per cent of the height of the flue and whenever possible a vertical run shall be provided before the horizontal branch. Bends shall be avoided and connections shall be made with forty-five (45) degree elbows. The vent connector shall not be smaller than the size of the flue collar of the gas-fired equipment. Where more than one outlet is provided, the common vent connector shall equal the combined area of the outlets.

114.36. Clearances.—Gas vent connectors shall have the following minimum clearances from combustible construction:

Type of Appliance	*Clearance in Inches*
Boiler, warm air furnace, water and space heaters	6
Floor furnaces	9
Incinerators	18

114.37. Reduced Clearances.—The clearances specified in section 114.36 may be reduced as follows when the combustible construction is protected as herein provided:

Type of Protection	*Reduced Clearance*
¼-inch asbestos millboard with 1-inch noncombustible furring	6 inches reduced to 3 inches 9 inches reduced to 6 inches 18 inches reduced to 12 inches
No. 28 U.S. gage metal on ¼-inch asbestos millboard or on 1-inch noncombustible furring	6 inches reduced to 2 inches 9 inches reduced to 4 inches 18 inches reduced to 9 inches

114.38. Unit Heaters.—Steam and hot water unit heaters shall be installed to provide clearances from combustible material of not less than one (1) inch to all heated portions thereof including the steam or hot water supply piping.

114.39. Wall Heaters.—Wall heaters shall not be located in walls or partitions of combustible construction unless tested and approved for such installation with integral insulation to prevent a temperature of more than two hundred and fifty (250) degrees F. on the exposed surface.

114.4. Location and Equipment of Heating Appliances.

114.41. Heater Room Ventilation and Air Supply.—All rooms containing heating appliances shall be provided with gravity or mechanical ventilation to prevent the accumulation of hot air over or near the appliance. Such spaces for other than electric-fired heating appliances, shall be provided with sufficient fresh air supply to insure proper combustion. (See section 1115.4, Basic Building Code.) For gas-fired equipment, openings shall be provided near floor and ceiling of not less than one (1) square inch clear area for each one thousand (1000) B.T.U. input per hour and openings to the outer air shall be protected with approved corrosion-resistive screens with not larger than one-half (½) inch mesh.

114.42. Prohibited Uses.—No solid, gas or liquid fuel-fired water heaters shall be installed in normally closed bathrooms, bedrooms or other inadequately ventilated habitable spaces or in any enclosed space with a volume of less than three hundred (300) cubic feet, except as provided for approved equipment with sealed combustion chambers and direct air supply for complete combustion as specified in section 113.51; nor shall vents designed for use with gas appliances be used with solid or liquid fuel-fired heat appliances except as provided in section 113.2; nor shall a vent from any gas appliance be inter-connected with any other vent pipe.

114.43. Boiler and Furnace Location.—Boiler rooms shall not be located immediately below exitways; nor shall any floor furnace be installed in any aisle or passageway used as a means of egress. All such rooms shall be vented to the outer air by direct vent openings, noncombustible ducts or window openings with automatic protectives complying with section 119.8.

In one- and two-family dwellings, central heating plants, warm air or floor furnaces may be located in the basement or rooms on the first floor provided the appliances are mounted on noncombustible floor construction of not less than three-quarter (¾) hour fire resistance insulated on top with not less than one-quarter (¼) inch asbestos mill board covered with No. 24 U.S. gage metal or the equivalent. The enclosure shall be of noncombustible construction with clearances and ventilation as herein provided. Heating furnaces shall not be installed in attics except of an approved type complying with the mounting and clearance provisions of this article and provided with type B vents complying with section 113.63.

114.44. Low Pressure Steam Boilers.—Low pressure steam boilers shall be equipped with an approved safety valve, water column, try cocks, gage glass and pressure gage; and the boiler feed, drain and all other connections shall be installed in accordance with accepted engineering practice.

114.45. Low Pressure Hot Water Boilers.—Low pressure hot water boilers shall be equipped with approved water valve, altitude gage and thermometer; and the boiler feed, drain and all other connections shall be installed in accordance with accepted engineering practice.

114.46. Gravity Warm Air Furnaces.—Gravity warm air furnaces shall be encased in a double metal casing with intervening air space extending from the top of the casing down to the bottom of the fire box. The top of the bonnet shall be insulated with not less than three (3) inches of sand, or with magnesia, asbestos or other noncombustible material on top of the bonnet. They shall be equipped with automatic controls to shut off the fuel supply when the temperature in the warm air pipe at a point within twenty-four (24) inches of the furnace exceeds two hundred and fifty (250) degrees F. Wall and ceiling clearances of gravity hot air furnaces shall comply with the requirements of section 114.3.

114.47. Floor Furnaces.—The outlet temperature of warm air floor furnaces shall be not greater than two hundred and fifty (250) degrees F. unless such installation is specifically approved. No floor furnace shall be placed closer than six (6) inches to the nearest wall of combustible construction. Floor furnaces shall not be installed in any corridor, aisle or passageway used as an exitway, nor shall such furnace extend below the floor into a garage or other space used for the storage of flammable materials unless enclosed in a metal enclosure of not less than No. 22 U.S. gage steel plate vented to the outer air. Only a gas-fired floor furnace shall be installed above the first story of a building and then only when the furnace assembly projects below the floor into a non-habitable space enclosed in three-quarter (¾) hour fire-resistive partitions with adequate direct air supply and means of access for purposes of servicing.

114.48. Gas-Fired Boilers and Furnaces.—All gas-fired boilers and furnaces shall be equipped with approved safety devices and controls to limit the temperatures and pressures of steam, water or air in accordance with the manufacturer's approved specifications and to automatically shut off or throttle the gas supply in the event of low water or of excess steam in vapor boiler systems.

114.49. Flexible Connections.—All flexible connections in gas-fired equipment shall be made with approved semi-rigid metallic tubing and fittings. No appliance equipped with a control valve which permits complete shut-off of the gas supply shall be connected with rubber hose or similar flexible tubing (see section 117.95); except portable appliances used in commercial construction or industrial operations. (See section 1129, Basic Building Code.)

114.5. Mechanical Warm Air Furnaces and Heating Systems.

114.51. Automatic System.—The furnace of an automatically fired warm air heating system which is equipped with an air circulating fan shall be provided with approved automatic control of the fuel supply whenever the temperature of the air in the furnace bonnet or at the main supply duct exceeds two hundred (200) degrees F. for low temperature systems or two hundred and fifty (250) degrees F. for high temperature systems.

114.52. Stoker Firing.—When the furnace is stoker fired, it shall be equipped with an automatic over-run control to start the fan when the air in the furnace bonnet or at the main supply duct reaches the temperatures prescribed in section 114.51 after the stoker and fan have shut down in normal operation.

114.53. Non-Automatic System.—In a system which it not automatically fired and which is not equipped with an approved temperature limit control, the dampers and shutters shall not be capable of shutting off more than eighty (80) per cent of the total duct area; or in lieu thereof one register or grille shall be installed without a closeable shutter, and the duct leading thereto shall be installed without a damper.

114.54. Registers.—When a register is located in a floor or wall of combustible construction, the register box shall be covered with twelve (12) pound asbestos paper, and a clear space of not less than five-sixteenth (5/16) inch shall be left between the sides of the box and any combustible material. When a register is installed in the floor over the furnace, the register box shall be of double construction, with an intervening air space of not less than four (4) inches, except when the warm air duct is surrounded by a cold air passage.

114.55. Air Recirculation.—No return duct of a mechanical circulation warm air system shall be permitted from a kitchen, bathroom, garage, or other space in which flammable or noxious vapors may be present; nor shall the recirculation of air from one dwelling unit be permitted to another dwelling unit.

114.6. Steam and Hot Water Piping.

114.61. Steam Pipes.—High pressure steam pipes shall have a minimum clearance of one (1) inch from all combustible material and when such pipes pass through combustible floors or partitions the openings shall be protected by metal or other approved noncombustible sleeves, and the open sleeve space shall be filled with noncombustible materials.

114.62. Insulation of Pipes.—All coverings or insulation used on steam and hot water pipes shall be of approved noncombustible materials; and where such pipes pass through stock shelving or are in close proximity to other combustible materials the insulation shall be not less than one (1) inch thick. They shall be installed to provide for all expansion and contraction due to temperature changes and all concealed heating pipes located in exterior walls shall be protected against freezing.

114.7. Oil Burners.

114.71. Permits.—Before any oil burning installation of more than six (6) gallons fuel capacity is placed in operation, a special permit shall be secured from the building official. No permit shall be required for the installation and use of portable burners or the type commonly used for household purposes which do not require a flue connection including oil stoves, oil heaters, and oil lamps equipped with a woven wick or for such portable apparatus as blow torches, soldering pots and tar and bitumen heaters required in construction operations.

114.72. Identification.—Each approved burner shall have permanently and prominently affixed thereto a metal plate, tag, or other approved device which certifies that it has been tested and approved by an accredited testing laboratory. Said certification shall also bear the manufacturer's or distributor's name, the number of the appliance, the hourly B.T.U. output rating; and the grade of fuel oil for which it is approved.

114.73. Instructions.—When installed, each burner shall be accompanied by complete printed instructions for igniting, operating, maintenance and shut-down procedure which shall be attached in a convenient location accessible to the installation.

114.74. Safety Devices—Each burner shall be provided with approved safeguards and protective devices for control of the oil supply, the mixing of the air, the ignition, oil pressure or high temperature limits, high and low water limits and for control of the burner when ignition fails. There shall also be provided a means of shutting off the burner from a conveniently safe point just inside or outside of the room where the boiler is located. Draft control shall be accomplished through an automatically operated stabilizer and no smokepipe dampers shall be installed with an automatic heating unit.

114.75. Tests.—When assembled, each burner shall be tested for defects and for proper functioning throughout the operating range.

114.76. Quality and Grade of Oils.—Oil for use in oil burners shall be of approved commercial standards and shall be free from acid, grit, fibrous and other foreign matter, with a flash point not lower than one hundred (100) degrees F. The use of crankcase refuse oil in oil-fired heating equipment shall be prohibited.

114.8. Fuel Oil Tanks.

114.81. Tank Construction and Identification.—A tank for the storage of six (6) gallons or less of oil shall be considered an integral part of the burner installation; and shall be included in the approval of the burner. All tanks of more than six (6) gallons capacity shall be constructed of tank steel plates of approved quality and thickness either welded, riveted and caulked or riveted and welded to meet test requirements. Interior small storage tanks may be constructed of other materials than steel when tested and approved to withstand a hydrostatic pressure of twenty-five (25) pounds per square inch. At the time of installation, all storage tanks shall have permanently and prominently affixed thereto a metal plate or tag bearing the name of the tank manufacturer, the gage thickness of the material of which the tank was constructed, the minimum weight of the tank and its capacity and certifying that it has been tested and approved.

114.82. Tank Vents.—All fuel oil storage tanks shall be equipped with an approved vent arranged to discharge to the open air. The vent openings and vent discharge shall be designed to prevent abnormal pressure in the tank during filling, but in no case shall such vent be less than one and one-quarter (1¼) inch pipe size. The outlet from the vent pipe shall terminate outside the building with the discharge end and located not less than two (2) feet vertically and horizontally from any window, skylight or roof structure opening in the same or any adjoining buildings and not more than twelve (12) feet above the fill pipe terminal. The top of such vents shall be protected with a weatherproof hood.

114.83. Emergency Pressure Relief.—Unless specifically exempted, all exposed fuel oil tanks shall be provided with an approved device for releasing excessive internal pressure in the event of fire.

114.84. Interior Storage Tanks.—Small storage or auxiliary tanks with a capacity of not more than two hundred and seventy-five (275) gallons may be installed above ground in the lowest story of a building, when mounted on substantial noncombustible supports and located at least seven (7) feet from any boiler, furnace, stove or exposed flame. Not more than two (2) such tanks shall be connected to any one burner, nor shall more than two (2) tanks of two hundred and seventy-five (275) gallons capacity each be installed in any one building unless protected as provided for large tanks. Tanks of more than two hundred and seventy-five (275) gallons capacity located within a building shall be installed on the lowest floor, protected with a reinforced concrete or masonry jacket; or buried with the top not less than two (2) feet below the floor level; or covered with a reinforced concrete slab not less than four (4) inches thick. Storage tanks buried in the ground shall be constructed of tank steel plates not less than one-quarter (¼) inch in thickness and shall be located not less than three (3) feet from any foundation wall or footing. The aggregate total capacity of storage tanks located within a building or structure shall be not more than twenty thousand (20,000) gallons.

114.85. Exterior Storage Tanks.—A storage tank above ground outside a building shall be located not less than one and one-quarter (1¼) tank diameters, but in no case less than ten (10) feet, from interior lot lines or from the nearest building or from any other tank. The capacity shall be limited by location in respect to property lines as specified in table 18. All exterior storage tanks above ground of more than ten thousand (10,000) gallons capacity shall be electrically grounded and shall be protected by an embankment or dyke with an enclosed volume of not less than one and one-half (1½) times the capacity of the tank. The height of the dyke shall be not more than one-quarter (¼) the height of the tank, but in no case less than four (4) feet. Underground tanks shall be anchored to a foundation of sufficient weight to prevent floating when necessary due to ground water conditions.

TABLE 18.—CAPACITY OF EXTERIOR FUEL OIL TANKS

Distance from lot lines in feet	Maximum capacity in gallons
25	16,000
30	24,000
40	36,000
50	48,000
60	60,000
70	96,000
85	100,000

114.9. Water Heaters.—(See section 117.7.)

All range boilers, hot water heaters and hot water storage tanks shall be equipped with temperature limit controls and pressure relief valves as herein required.

114.91. Range Boilers and Hot Water Heaters.—All range boilers, hot water heaters and storage tanks shall be equipped with approved temperature controls and pressure relief valves.

114.92. Automatic Hot Water Supply.—Automatic or remote control ignition equipment on domestic hot water heating devices using gas or liquid fuel shall be installed only in connection with a burner equipped with a safety pilot or other approved device arranged to automatically shut off the fuel supply to the main burners, if the pilot flame is extinguished. All gas water heaters with an automatic remote-control pilot, or with means of lighting other than a manual method, shall be equipped with approved down draft diverters on the flue pipe from the heater arranged to prevent extinguishment of the pilot or heating flame.

114.93. Direct-Fired Gage Equipment.—Approved relief valves and pressure gauges shall be installed in all direct-fired cast-iron water heaters with cored sections, and in all heaters with a check valve located between the water meter and the heater or tank.

114.94. Pressure Relief Valves.—The rate of discharge of pressure valves shall limit the pressure rise to ten (10) per cent of the pressure at which the valve is set to open for the manufacturer's specified heat input.

114.95. Temperature Relief Valves.—Temperature relief valves shall be capable of discharging sufficient hot water at two hundred and ten (210) degrees F. without any further rise in temperature.

114.96. Vacuum Relief Valves.—All copper tanks shall be equipped with approved vacuum relief valves.

114.97. Relief Outlet Wastes.—The size of relief outlet waste valves shall be not less than the cross-sectional area of the valve discharge outlet. No pressure, temperature or other type relief valve shall discharge directly to the building drainage system. (See section 117.3.)

SECTION 115.0. REQUIREMENTS FOR LIGHT AND VENTILATION

115.1. Natural Light and Ventilation.—Every habitable and occupiable room or space shall be provided with windows, skylights, monitors, glazed doors, transoms, glass-block panels or other light and air transmitting media opening to the sky or to a public street, or to a legal yard, court or other unoccupied space on the same lot with the building, complying with the provisions of this code, so arranged to provide as uniform distribution of light and fresh air as practicable of the intensity and quantity herein prescribed. Rooms used for other than residence purposes may be provided with the alternate artificial lighting and mechanical ventilation specified in section 115.2.

115.11. Standard of Natural Light.—In the application of the provisions of this code, the standard of natural light shall be deemed an average illumination equal to six (6) foot candles as uniformly distributed as practicable on every part of the room area at a height of thirty (30) inches above the floor level.

115.12. Standard of Natural Ventilation.—In the application of the provisions of this code, the standard of natural ventilation in all habitable spaces shall be based upon a volume of four hundred (400) cubic feet of air per occupant, with the accessory windows or other ventilating devices located in the exterior walls or on the roof of the building for fresh air supply.

115.13. Window Size.—In all rooms and spaces used for residence purposes, the aggregate glass area of required windows, doors, skylights and other approved light and ventilation media shall be not less than one-tenth (1/10) of the floor area served, with not less than one-half (½) of the aggregate required glass area available for unobstructed ventilation. In lieu of windows, the glass area in exterior doors may be accepted for one hundred (100) per cent of the light requirement, but not more than twenty-five (25) per cent of the ventilation requirement.

115.14. Rooms Below Grade.—No room which has less than one-half (½) of its height above the finished grade shall be occupied as a habitable room. The provisions of this section shall not be construed to prohibit play, recreation or similar rooms at a greater depth below grade.

115.15. Bath and Toilet Rooms.—Every required bath and toilet room shall be ventilated as herein prescribed: by windows opening to the outer air as specified in section 115.13 but in no case less than three (3) square feet in area; by windows opening on a vent shaft with a cross-sectional area of one (1) square foot for each foot in height, but not less than nine (9) square feet in area, open at the top or constructed with equivalent side louvre openings; by vents or ducts of steel or other noncombustible material complying with tables 15 and 16 of adequate height to insure a minimum supply of two (2) cubic feet of air per square foot of floor area per minute, but not less than one-half (½) square foot in cross-sectional area and one-third (⅓) additional square foot for each additional water closet or urinal above two (2) in number; by a skylight of approved noncombustible construction not less than three (3) square feet in area with ventilating openings; or for other than one- and two-family and multi-family dwellings, by a system of mechanical ventilation or gravity ventilator with an approved siphon-type hood, capable of exhausting forty (40) cubic feet of air per minute in public bathrooms and not less than twenty-five (25) cubic feet of air per minute in private bathrooms.

115.17. Alcove Rooms.—Alcove rooms shall open without obstruction into adjoining rooms and the required light and air shall be based upon the combined floor area. No such alcove space shall be more than sixty (60) square feet in area and the opening to the adjoining rooms shall be not less than eighty (80) per cent of the superficial area of the division wall.

115.18. Institutional Buildings.—In buildings of the institutional use group, every habitable and occupiable room shall be provided with light and ventilation as required in this code for residence uses; except that in buildings for the enforced detention of people, indirect openings to the street or court may be permitted through intermediate corridors or by other approved mechanical and artificial means.

115.19. Places of Public Assembly.—All places of public assembly during occupancy shall be illuminated by sufficient natural or artificial light to permit the reading of an ordinary newspaper. When natural light and ventilation are provided, the required openable window area or other approved devices for natural light and ventilation shall be distributed as uniformly as practicable on at least two (2) sides of the room.

115.2. Artificial Light and Ventilation.—When natural light and ventilation are inadequate to insure the health and safety of human occupants, or when the use and occupancy of a building or part thereof involve the presence of dust, fumes, gases, vapors or other noxious or deleterious impurities that create a fire or health hazard, such building shall be equipped with artificial light and mechanical ventilation as herein provided.

115.21. Intensity of Illumination.—The intensity of illumination of habitable and occupiable rooms shall be equivalent to six (6) foot candles as specified in section 115.11, and of bath and toilet rooms equivalent to three (3) foot candles. All areas and portions of buildings used as places of public assembly other than theaters shall be lighted by electric light to provide a general illumination of not less than one (1) foot candle.

115.22. Mechanical Ventilation. — Where mechanical ventilation is accepted as an alternate for natural means of ventilation or is required under the provisions of this code, equipment and distribution shall comply with section 118, and such systems shall be kept in operation at all times during normal occupancy of the building, room or space so equipped. Mechanical or gravity systems of ventilation shall provide the minimum fresh air supply in cubic feet per minute per square foot of floor area prescribed in table 19.

TABLE 19.—REQUIRED MINIMUM FRESH AIR SUPPLY

Use of room or space	Number of air changes per hour	Cubic feet per minute per square foot
Auditoriums and public assembly	6	1½-2
Bath and toilet rooms		
private	5	1
public	6	2
Convention halls	6	2
Dance halls	6	2
Interior cooking spaces	6-8	2-3
Institutional		
ward and class rooms	4	1½
operatingrooms	10	5
Kitchens		
private	3	1-1½
public	8	3
Living and bed rooms	2	½
Locker and rest rooms	4	1½
Offices and jails	2	½
Work rooms		
Under 1000 cubic feet per individual	4	1½
1000 cubic feet or more per individual	2	½

115.3. Attic Spaces.—All attic spaces and unoccupied spaces between roofs and top floor ceilings shall be ventilated by not less than two (2) opposite louvres or vents with a total clear area of opening not less than one-third (⅓) of one (1) per cent of the horizontally projected roof area.

115.4. Crawl Spaces.—Access spaces under grade floor construction and wherever wood, gypsum, metal or other floor construction subject to corrosion or deterioration is installed above the ground without basements shall be provided not less than eighteen (18) inches in depth. Such spaces shall be vented with screened openings having a clear area of not less than one-third (⅓) of one (1) per cent of the enclosed building area or shall be provided with other equivalent means of artificial ventilation. The screens shall be corrosion-resistive and rodent-proof complying with section 116.43. When floating mat foundations are provided in accordance with section 110.3, the requirement for ventilation shall not apply.

115.5. Stairways and Exitways.

115.51. Illumination.—All stairways, exitways and passageways appurtenant thereto in other than one- and two-family dwellings shall be equipped with artificial lighting facilities to provide an intensity of illumination of not less than three (3) foot candles at all times that conditions of occupancy of the building require the exitways to be available.

115.52. Multi-family and Institutional Buildings.—In multi-family buildings and in institutional buildings for the care, treatment or education of people, required interior stairways and the hallways shall be provided with windows having a glass area of not less than ten (10) square feet which open on a street, alley, yard or court or with the equivalent source of light for each story through which the stairway passes. Windows in hallways shall be so located that light penetrates the full length of the hallway.

115.6. Courts.—Every court which serves windows for light and ventilation shall have a minimum width of three (3) inches for each foot of height or fraction thereof but not less than five (5) feet for outer courts and twice these values for inner courts. Gore courts shall be not less than five (5) feet wide at any point. All courts required for light and ventilation shall be located on the same lot with the building or structure served thereby.

115.7. Yards.—The depth of a yard required for light and ventilation for buildings of the residence use group shall not be less than fifteen (15) feet for a height of not more than thirty-five (35) feet and shall increase four (4) inches in depth for each additional foot in height; except that for a corner lot the minimum depth shall be not less than ten (10) feet; and when the lot is less than sixty-five (65) feet in depth, the required depth of the yard may be decreased six (6) inches for each foot less than sixty-five (65) feet. For buildings of all other use groups, the minimum depth of a required rear yard shall be not less than ten (10) feet.

115.8. Motor Vehicle Parking.—Court and yard areas may be used for automobile parking spaces or private garages not more than one (1) story in height, when accessory to and only for the use of the occupants of the building; provided that no such parking space or accessory building shall be located within five (5) feet of a required window opening in the main building.

115.9. Shaft Enclosures.—All vertical shafts, other than stairway enclosures, extending through more than one (1) story of a building or structure including dumbwaiter and elevator hoistways shall be enclosed in fire-resistive construction complying with the requirements of table 5 of the Basic Building Code (see appendix E) and shall be vented as herein specified with skylights, windows or ducts opening to the outer air or with other equivalent means of ventilation.

115.91. Open Shafts.—The enclosing walls of shafts for light and ventilation purposes that are open to the outer air at the top shall be constructed as provided for exterior enclosure walls in section 112.

115.92. Covered Shafts.—The enclosing walls and the top of interior covered shafts shall be constructed of approved masonry walls or other assemblies having a fire-resistance rating of not less than two (2) hours, except as provided in section 115.93.

115.93. One- and Two-Family Dwellings.—In one- and two-family dwellings which are not more than two and one-half (2½) stories in height of other than fire-resistive construction, interior shafts shall be supported and constructed with materials having a fire-resistance rating of not less than three-quarter (¾) hour and shall in all cases extend not less than three (3) feet above the adjoining roof.

115.94. Shafts Extending to Roof.—All shafts and hoistways that extend to the roof of a building or structure shall be covered at the top with a skylight of at least three-quarters (¾) the area of the shaftway constructed of approved noncombustible materials and glazed with not less than three-sixteenths (3/16) inch plain glass protected with non-corrosive, noncombustible screens above and below. The skylights herein required may be replaced by one or more side windows of equivalent area provided the sill is not less than two (2) feet above the adjoining roof and the opening is not located on the lot line or within twenty (20) feet of an opening in adjacent walls.

115.95. Shafts Not Extending to the Roof.—All shafts that do not extend into the top story of a building or structure shall be enclosed at the top with construction of the same strength and fire resistance as the construction type in which it occurs, but in no case less than that of the required fire-resistance rating of the shaft enclosure. Such shafts shall be provided with gas and smoke relief ducts or vents or approved mechanical means of ventilation in conformity to the provision of section 118.

115.96. Bottom Enclosures.—All shafts that do not extend to the bottom of the building or structure shall be enclosed at the lowest level with construction of the same strength and fire resistance as the lowest floor through which it passes, but in no case with a fire-resistance rating less than that of the shaft enclosure.

115.97. Thermostatic Control.—In other than one- and two-family dwellings, the skylights, windows and other vent relief devices shall be controlled by fusible links designed to operate at a fixed temperature of not more than one hundred and sixty (160) degrees F.; or by electric or pneumatic operation under a rapid rise in temperature at a rate of fifteen (15) to twenty (20) degrees F. per minute; or by other equivalent approved methods.

115.98. Elevator Machine Rooms.—The platform of machine rooms located at the top of elevator shafts, when of solid construction, shall be pierced with one or more vent openings with a gross area of not less than two (2) square feet for each elevator in the enclosure, but in no case less than ten (10) per cent of the shaft area.

115.99. Existing Shaftways.—In all existing shaftways in buildings of the multi-family and hotel use groups, the institutional use group and assembly use group, and all buildings with an occupancy load of more than seventy-five (75) above or more than forty (40) below grade, which are not already enclosed as herein required, the building official shall direct such construction as he may deem necessary to insure the safety of the occupants.

SECTION 116.0. WATERPROOFING, RATPROOFING AND TERMITE PROTECTION

116.1. Foundation Walls and Cellar and Basement Waterproofing.—Where habitable and occupiable rooms are located below grade and when required by the physical topography and the ground water conditions, foundation walls below the ground level, and the basement floor of all buildings in the residential and institutional use groups shall be dampproofed and where necessary adequately reinforced to withstand hydrostatic pressure and to insure a dry basement.

116.2. Foundation Wall Reinforcement.—When required by lateral water pressure, the reinforcement of eight (8) inch concrete basement walls supported laterally at the top and bottom shall consist of not less than one-half (½) inch round verticals spaced twelve (12) inches on centers and one-half (½) inch round horizontals spaced twenty-four (24) inches on centers. For all conditions of support, the reinforcement shall be determined by accepted engineering analysis.

116.3. Soil Drainage.—When required by soil conditions, sub-surface drainage shall be provided under the foundation slab in conformity to section 110.8.

116.4. Ratproof Apron.

116.41. Grade Protection.—Where local conditions require protection against rats or other rodents, the exterior walls at and near grade of all buildings and structures enclosing habitable or occupiable rooms and spaces in which persons live, sleep or work, or in which foodstuff or food is stored, prepared, processed, served or sold, shall be constructed or chemically or otherwise treated or assembled of component materials to be rat- and vermin-proof. When not provided with a masonry foundation wall, a continuous apron of masonry or concrete not less than four (4) inches thick or of other water-resistant material of equal strength shall be installed around the entire perimeter of the building.

116.42. Height of Apron.—The apron shall extend sufficiently above grade to provide protection against the average snowfall in the locality, but not less than eight (8) inches above and twenty-four (24) inches below grade level; but, if serving as a load bearing foundation wall, to sufficiently greater depth to assure protection from frost action as provided in section 110.

116.43. Protection of Wall Openings.—All openings in the apron required for ventilation in section 115.4 or for other purposes shall be guarded with corrosion-resistive rodent-proof shields of not less than No. 22 gage perforated steel sheets or No. 20 B&S gage aluminum or No. 16 gage expanded metal or wire mesh screens with not more than one-half (½) inch mesh openings.

116.44.—Protection of Grade Floor Slab Openings.—Exterior walls shall be effectively tied to the slab without open spaces between slab and walls All access openings in the slab shall be closed with concrete, masonry, metal or other corrosion-resistive noncombustible covers of adequate strength to support the the floor loads. Pipe, conduit, cable and similar openings shall have snugly-fitting collars to eliminate all open spaces.

116.45. Wall Chases.—The backs and sides of chases in exterior walls including recessed apron walls shall be made water-tight and when less than eight (8) inches of masonry is exposed to the weather, it shall be waterproofed with a mastic membrane, cement coat or other approved method.

116.5. Protection of Lumber.

116.51. Grade Construction.—All untreated wood in exterior walls at grade shall be supported on concrete or other masonry walls or piers laid in cement mortar and, where required, all wood shall be impregnated with approved preservative and termite-proof treatments.

116.52. Wall Pockets.—Wood girders framing into masonry walls shall have one-quarter (¼) inch air spaces on both sides and ends for ventilation purposes or otherwise protected with approved preservative treatments.

116.53. Cellar Columns.—No wood posts shall be used in damp locations in cellars or basements or below grade level except when decay-resistant or approved pressure-treated materials are used, or adequate ventilation is provided to prevent decay. All wood posts shall rest on concrete pedestals as provided in section 111.4.

116.6. Termite Shields.—Where termite protection is required by local conditions, metal shields of unpierced aluminum, copper, galvanized steel of not less than No. 26 U. S. gage or its equivalent or of other corrosion-resistive materials shall be bedded continuously in cement mortar on top of masonry foundation walls extending not less than two (2) inches beyond the face of the wall and bent downward at an angle of forty-five (45) degrees to form a protecting hood.

116.7. Removal of Building Debris.—No loose wood, form material or other debris subject to decomposition shall be buried or left under floors, porches, or around foundation walls.

SECTION 117.0. PLUMBING, WATER SUPPLY AND GAS PIPING

117.1. Standard of Accepted Engineering Practice.—The National Plumbing Code known as Domestic Commerce Series No. 28—June 1951 is accepted as the recognized standard of accepted engineering practice in governing the requirements for the design and installation of plumbing systems, including sanitary and storm drainage, sanitary facilities, water supplies and storm water and sewage disposal in buildings.

117.2.—Deleted.—No requirements.

117.3.—Deleted.—No requirements.

117.4.—Deleted.—No requirements.

Table 20.—Deleted.

117.5. Sanitary Fixtures.—Every building and structure designed for human occupancy and every construction operation shall be provided with a sufficient number of approved fixtures located and installed as required by this code for the removal of human excreta and other wastes, for the purpose of cleansing persons, apparel or utensils and for providing potable water supplies.

117.51. Number of Fixtures.—The number of water-flushed toilet fixtures required for each sex shall be not less than specified in tables 21 and 22; and the requirements shall be separately computed on the basis of the maximum number of persons of each sex having access at any time to such facilities on the premises for which they are furnished.

TABLE 21.—MINIMUM NUMBER OF SANITARY FIXTURES FOR ALL USE GROUPS OTHER THAN RESIDENTIAL AND ASSEMBLY

Occupancy load	Waterclosets	Lavatories
1-15	1	1
16-50	3	2
51-75	4	2
76-100	5	3
101-150	7	4
151-200	8	4
Over 200	1 for each 30 additional occupants	1 for each 60 additional occupants

TABLE 22.—MINIMUM NUMBER OF SANITARY FIXTURES FOR ASSEMBLY USE EXCEPT SCHOOLS, COLLEGES AND CHURCHES

Occupancy load	Waterclosets	Lavatories
1-100	3	2
101-250	6	3
251-500	8	4
501-1000	12	6
1001-1500	15	8
1501-2000	17	9
Over 2000	1 for each 200 additional occupants	1 for each 400 additional occupants

117.52. Credit for Urinals.—The number of urinals required for men shall be not less than one-third (⅓) of the number of required watercloset fixtures. When provision is made for more than thirty (30) males, a credit of one (1) watercloset will be allowed for each urinal furnished.

117.53. Hotels and Dormitories.—In hotel and dormitory residential buildings (use group L-1), there shall be not less than one (1) toilet room for each sex for every six (6) sleeping rooms, and there shall be not less than one (1) watercloset, one (1) lavatory, and one (1) tub or shower bath for every six (6) persons or part thereof for whose use it is intended in each toilet room. The toilet room shall be readily accessible and in no case more remote than one (1) floor above nor more than one (1) floor below the location of the sleeping rooms for which it is designed.

117.54. Single and Multi-Family Dwellings.—In one- and two-family and multi-family dwellings (use groups L-2 and L-3), there shall be provided in each dwelling unit one (1) toilet room and one (1) kitchen sink located in separate rooms. The toilet room shall contain not less than one (1) watercloset, one (1) lavatory and one (1) tub or shower bath.

117.55. Schools and Colleges.—In school buildings (use group F-4), with an occupancy load of two hundred (200) or less, the provisions of table 21 shall apply. When designed for a greater occupancy load, there shall be at least one (1) toilet fixture for each forty (40) pupils; and in boys' toilet rooms not less than one-fourth (¼) of the fixtures shall be waterclosets.

117.56. Churches.—In church buildings (use group F-4) not less than one (1) toilet fixture shall be provided for each one hundred (100) occupants of each sex; and at least one-third (⅓) of the fixtures for the male sex shall be urinals to comply with section 117.52.

117.57. Bath and Toilet Room Enclosures.—All bath and toilet rooms shall be enclosed in walls or partitions for full story heights; or in lieu thereof shall be provided with an independent ceiling having a clear height of not less than seven (7) feet four (4) inches; except as provided for auxiliary toilets in one- and two-family dwellings. In all buildings, other than residential buildings, toilet installations shall afford individual privacy by means of partitions between waterclosets, provided with latched doors for individual compartments so arranged as to permit free circulation of air throughout the toilet compartments; and the doorway shall be installed to screen the inside of the toilet room. Where more than one (1) watercloset is required, separate toilet rooms shall be provided for each sex.

117.58. Auxiliary Toilets.—In one- and two-family dwellings, an auxiliary toilet compartment may be installed in the basement enclosed in approved dwarf partitions.

117.59. Materials of Construction for Fixtures and Connections.—Water-flush closets, urinals, and other receptacles for the disposal of human excreta shall be made of vitreous earthenware, or cast iron with porcelain-enameled interior surfaces or of other approved impervious and sanitary materials. Kitchen sinks for dishwashing and culinary purposes shall be made of approved corrosion-resistive and non-absorbent materials and shall be installed so that the space underneath each fixture is readily accessible for inspection and cleaning. All approved plumbing fixtures and devices shall be connected and installed as provided in this code and the approved standards; and no fixture or device shall be indirectly connected to the plumbing or drainage system when such connection would be detrimental to the public health or to the occupants of the building or structure. The unit rating or fixture equivalent of all plumbing fixtures shall be used to determine the size of wastes, vents and traps as specified in table 23.

TABLE 23.—FIXTURE EQUIVALENTS

Type of fixture	Unit rating		Size of trap and fixtures in inches
	Private use	Public use	
Refrigerator or ice box	½	1	1¼
Sterilizer (½″ waste)	½	1	1¼
Drinking fountain	1	1	1¼
Dental or fountain cuspidor	1	1	1¼
Lavatory or wash basin	1	2	1¼
Swimming pool for each 1000-gallon capacity	1	2	1½
Urinal trough for each 2 feet	1	2	1½
Lavatory, multiple	2	4	1½ & 2
Bath tub and similar fixtures	2	4	1½ & 2
Shower stall and shower bath	2	4	1½ & 2
Laundry tray	2	4	1½
Floor drain	2	2	1½
Floor drain, rim flush	—	3	2
Sink other than slop sink	2	4	1¼ & 1½
Slop sink	—	3	2
Sink, flushing rim and valve	—	10	3
Combination fixture	2	3	1½
Shower stall, multiple spray	—	4	2
Urinal stall	3	5	1½ & 2
Hose connection	3	5	1½ & 2
Sump (24″ diameter)	4	4	2
Urinal, siphon jet or pedestal	6	10	2 & 3
Bath tub or shower	6	12	2 & 3
Bath room group, bath tub and shower	8	8	3
Water closet, bed pan washer and similar fixtures	6	12	3

117.6. Soil and Fixture Traps and Vents.—Each plumbing fixture shall be separately trapped as near to such fixture as possible, except as provided herein. All traps shall be self-cleaning and shall be designed to hold a minimum water seal of two (2) inches. Such traps shall have the same nominal inside diameter as the drain or waste pipe connecting thereto, and shall be provided with an approved cleanout. They shall be vented to insure complete air circulation and to protect against siphonage and back pressure; except that no vents will be required on down spouts, rain leaders, back-water or sub-soil catch-basin traps, or on floor-drain traps when connected to the storm water drain on the building side of a building trap. No fixture, plumbing waste, soil line or storm drain, or any combination thereof, shall be double trapped; except that a building trap when used shall be exempt from this requirement; and except further that two (2) single compartment laundry trays, a combination sink and laundry tray, or one (1) double compartment laundry tray or sink may be connected into a single trap.

117.61. Main Building Trap.—In localities subject to prolonged periods of freezing temperatures or where the public sewer or septic tank or other sewage disposal system due to inadequate capacity or otherwise requires additional safeguards against the diffusion of sewer air into the building or structure in which plumbing fixtures or leaders are installed, such buildings or structures may be provided with a main building trap or equivalent device. When used, such building trap shall be located in the main building drain inside of the property line near the front wall of the structure and on the sewer side of all plumbing connections; and shall have a fresh air inlet pipe of not less than one-half (½) the diameter of the building drain discharging through the trap; except that the discharge from a sewer-lift, oil separator, blow-off pipe or from rain water leaders may connect on the outside of the main trap.

117.62. Storm Water Trap.—All storm water drains shall be trapped before entering any combined sewer, building sewer or main building drain which is designed to carry sewage; but no trap shall be required for storm water drains which are connected to a sewer exclusively discharging storm water. In no case shall the storm water trap be omitted from garages, gasoline stations or other buildings, structures or premises from which flammable or explosive liquids or other hazardous wastes may discharge into the storm drain or building sewer.

117.63. Back-Water Trap.—When subject to back-flow, flooding or other flow interference, drains, building sewers and storm sewers shall be provided with back-water valves, traps or other equivalent approved devices.

117.64. Size and Length of Vents.—The diameter of an individual vent shall be not less than one-half (½) the diameter of the drain to which it connects but in no case less than one and one-quarter (1¼) inches in diameter. Main vents and vent stacks shall be not less than one-half (½) the diameter of the soil or waste stack and the permissible length shall be limited by the number of fixture units vented thereby as prescribed in table 25.

117.65. Distance of Vent from Trap.—The permissible length of branch drains to vent shall be determined by the slope and size of fixture as regulated by table 24. The developed length of a branch drain permissible without venting shall be not more than eight (8) feet; except that the building

TABLE 24.—LENGTH OF BRANCH DRAIN TO VENT

In feet

Size of fixture in inches	Sanitary tee		Long turn TY or combination Y and ⅛ bend	
	¼″ slope	½″ slope	¼″ slope	½″ slope
1¼	4	2½	1½	1
1½	4½	3	4	2
2	5	4	4	4
3	6	6	6	6
4	8	8	8	8

official may permit fifteen (15) feet on a branch drain from a surgical operating table or fixtures for similar uses.

TABLE 25.—MAXIMUM LENGTH OF VENTS
In feet

Size of soil or waste in inches	Number of fixture units	Size of vent in inches								
		1¼	1½	2	2½	3	4	5	6	8
1¼	2	75	—	—	—	—	—	—	—	—
1½	8	70	150	—	—	—	—	—	—	—
2	12	30	75	310	—	—	—	—	—	—
2	24	28	70	300	—	—	—	—	—	—
2½	42	—	35	140	450	—	—	—	—	—
3	30	—	20	80	260	650	—	—	—	—
3	60	—	18	75	240	600	—	—	—	—
4	100	—	—	35	100	260	1100	—	—	—
4	250	—	—	30	95	240	1000	—	—	—
4	500	—	—	22	70	180	750	—	—	—
5	550	—	—	—	28	70	320	1000	—	—
5	1100	—	—	—	20	50	240	750	—	—
6	950	—	—	—	—	20	95	240	1000	—
6	1900	—	—	—	—	18	70	180	750	—
8	1800	—	—	—	—	—	30	80	350	1100
8	3600	—	—	—	—	—	25	60	250	800
10	2800	—	—	—	—	—	—	30	80	350
10	5600	—	—	—	—	—	—	25	60	250

117.66. Location of Vents.—Except in approved watercloset and similar fixtures, the vent opening from the soil or waste pipe shall be located above the dip of the trap. Crown vents shall be prohibited. All vent stacks shall connect full size at their base to the main soil or waste pipe at or below the lowest fixture or branch and shall extend undiminished in size at least one (1) foot above the roof, except when the roof is used for purposes and uses other than as a weather covering, the vent stack shall extend to a height of not less than six (6) feet, or it may return to the main soil or waste vent at least three (3) feet above the highest fixture branch. When the main stacks are grouped into one pipe which extends through the roof, the gross area of the combined vent stack shall be not less than seventy-five (75) per cent of the aggregate areas of the connecting stack. Waste stack increases shall be provided in accordance with section 117.23.

117.67. Group Venting.—A complete bathroom unit with watercloset or a group of other fixtures located directly adjacent to each other, or when such fixtures are located back-to-back on opposite sides of a wall, may be provided with a common vent. A battery of three (3) fixtures, attached to a single soil branch or branch waste may be vented by a continuous loop or circuit-vent. The vent connection of such loop to the branch shall be located between the two (2) fixtures most distant from the stack.

117.7. Water Supply Systems.—Every building in which people live, work or congregate shall be provided with a supply of clean, cool and potable water in sufficient quantity to maintain all water supply and plumbing fixtures in a safe and sanitary manner; and such other water supplies as may be required for fire-extinguishing, air conditioning and other service equipment of the building or structure. Minimum water supply connections shall comply with table 26. Where the required capacity of potable water supplies is available from public water mains at the site every building and structure shall be supplied from such mains to provide for all its service equipment. When public water mains are not available, a private source of water supply from drilled, driven or dug wells may be used.

Such wells shall be located to avoid contamination as provided in section 117.4 and samples of the water shall be submitted periodically to the health official for analysis and approval.

TABLE 26.—MINIMUM WATER SUPPLY CONNECTIONS
Size in inches

Type of fixture	Cold water	Hot water
Lavatory	⅜	⅜
Soda fountain sink	⅜	⅜
Bath tub	½	½
Sink and tray	½	½
Dental cuspidor	½	½
Shower, each head	½	½
Wash sink, each set of faucets	½	½
Sink,		
flushing rim	1	½
pot or scullery	¾	¾
Bath room group	¾	¾
Urinal,		
stall	¾	—
pedestal	1	—
trough for each 2 feet of length	½	—
Water closet,		
flush valve	1	—
Water closet,		
tank	⅜	—

117.71. Main Water Service Shut-Off.—An approved main shut-off valve shall be provided on the discharge side of the water service pipe controlling all outlets in the building.

117.72. Cross-Connections.—No cross-connection shall be made between the potable water distribution system and non-potable water supplies or any portion of waste or soil systems, nor shall fixture or devices be installed that may contaminate, pollute, or otherwise render the water unsafe. Water from unapproved sources for industrial processing or for fire protection shall be identified at each outlet with an approved sign stating that the water is unfit and that its use is prohibited for drinking purposes. Piping carrying potable waters shall be distinguished and identified from water piping from unapproved sources by distinctive painting and appropriate signs.

117.73. Supply for Multiple Fixtures.—In buildings with multiple plumbing fixtures, a residual pressure of not less than five (5) pounds per square inch at the highest fixture in the building measured on the pressure side of any wide-open faucet or supply shall be provided under conditions of simultaneous use of all such fixtures throughout multiple tenant buildings, or in any case under the conditions of peak demand. When the water supply is used from the municipal main and is inadequate to meet this requirement, one or more approved automatically controlled pressure or gravity tanks shall be installed of sufficient capacity to supply those parts of the installation which are too high to be fed from risers directly connected to the street water main.

117.74. Water Supply Piping.—A stop and drain cock or valve shall be installed on the building side of every main supply line and on risers from pressure or gravity tanks located at or near the source. A separate accessible stop and drain cock valve shall be provided at the foot of each branch riser line for each group of fixture outlets controlled by any one tenant or for any one floor in every business and in multi-family dwellings. Each individual watercloset shall be provided with a separate shut-off valve.

117.75. Domestic Hot Water Supply Systems.—Domestic hot water boilers, range boilers and water backs of heating boilers shall be equipped with temperature, pressure and safety relief devices as provided in section 114.9. The minimum sizes of hot water piping shall comply with table 26.

117.76. Brass and Copper Pipe.—Brass pipe with threaded fittings or when used with approved welded joints shall have a copper content of not less than eighty-four (84) per cent. The minimum permissible thickness of brass and copper pipe shall comply with table 27.

TABLE 27.—MINIMUM WALL THICKNESS OF THREADED AND WELDED BRASS AND COPPER PIPE
in inches

Diameter in inches	Threaded	Welded
⅜	0.09	0.065
½	0.107	0.065
¾	0.114	0.065
1	0.126	0.065
1¼	0.146	0.065
1½	0.150	0.065
2	0.156	0.065
2½	0.187	0.068
3	0.219	0.083
3½	0.25	0.095
4	0.25	0.107
4½	0.25	0.125
5	0.25	0.132
6	0.25	0.158

117.77. Copper Water Tube.—Copper water tube for use with soldered fittings shall have a copper content of not less than ninety-nine and nine-tenths (99.9) per cent. Copper water tube shall comply with table 28 for average dimensions.

TABLE 28.—AVERAGE DIMENSIONS OF COPPER WATER TUBE

Water tube nominal size	Outside diameter in inches	Wall thickness in inches*		
		Type K	Type L	Type M
⅜	0.500	0.049	0.035	——
½	0.625	0.049	0.040	——
⅝	0.750	0.049	0.042	——
¾	0.875	0.065	0.045	——
1	1.125	0.065	0.050	——
1¼	1.375	0.065	0.055	——
1½	1.625	0.072	0.060	——
2	2.125	0.083	0.070	——
2½	2.625	0.095	0.080	0.065
3	3.125	0.109	0.090	0.072
3½	3,625	0.120	0.100	0.083
4	4.125	0.134	0.110	0.095
5	5.125	0.160	0.125	0.109
6	6.125	0.192	0.140	0.122

*Copper tubing in soil and waste systems shall be limited to type K tubing.

117.78. Solder Joints.—Solder joints in copper tubes with approved fittings shall be cleaned bright, fluxed and soldered with approved materials complying with the applicable standards in appendix B.

117.79. Submerged Inlets.—Submerged inlets shall be prohibited; except that such plumbing fixtures in which the proper functioning does not permit an air gap adequate to prevent back siphonage shall be equipped with vacuum breakers or other approved safety devices. When back siphonage or contamination of water supplies is not otherwise provided for, water supply inlets to all fixtures, devices, apparatus or appliances shall be located to establish an air gap of not less than two (2) times the diameter for circular openings and two and one-half (2½) times the square root of the area for openings of other shapes, but in no case shall such gaps be less than one (1) inch.

117.8. Drainage Systems.

117.81. Sewer Connection.—The drainage system conveying storm water from roofs, paved areas and courts, except that pertaining to private garages on the rear of lots, shall be connected to the building sewer, storm sewer, combined sewer, or other approved disposal terminal in accordance with this code; and all sub-soil drains on the same lot shall be connected to the plumbing or drainage system of the building within the lot lines.

117.82. Sump Tank.—If sub-soil drains are located below the building sewer level, the discharge shall be collected in a sump or receiving tank and shall be automatically lifted and discharged into the drainage system.

117.83. Combined Drain.—When necessary to connect sub-soil drainage into a combined drain which carries sanitary sewage, a running trap or sump with accessible cleanout shall be installed in front of the drain connection.

117.84. Floor and Roof Drains.—Each floor drain leading to a storm drain shall be trapped to comply with section 117.6 and all roof drains shall have approved strainers, except when draining to hanging gutters.

117.85. Conductors and Leaders.—Conductors or leaders shall not be used as soil, waste or vent pipes; nor shall any soil, waste or vent pipe be used as a conductor unless it is installed in accordance with this code. All conductor roof openings shall be protected with approved screens or baskets of noncombustible materials. When placed within the walls of any building or installed in an inner court or in a ventilating pipe shaft, all rain water conductors and roof leaders shall be equipped with cleanouts at their bases. Along driveways and alleyways without sidewalks, rain water leaders and conductors when not installed in wall chases shall be protected from mechanical injury by wheel guards; or such conductors shall re-enter the building at a forty-five (45) degree inclination through the wall at least ten (10) feet above the established grade. The size of leaders and piping shall be based on the area drained thereby as provided in table 29. When the maximum rate of rainfall in any locality is more

TABLE 29.—MAXIMUM DRAINED AREA OF STORM WATER DRAINS AND LEADERS
In square feet

Size in inches	Fall per foot in inches		
	⅛″	¼″	½″
2	400	600	900
2½	700	900	1200
3	1100	1500	2100
4	2300	3000	4500
5	4200	6000	8500
6	6700	9500	13,500
8	14,000	20,500	29,000
10	26,500	37,000	56.000
12	43,000	60,000	85,000
15	78,000	110,000	155,000
18	127,000	180,000	255,000
21	192,000	271,000	384.000
24	276,000	390,000	550,000

or less than four (4) inches per hour, the roof area specified may be proportionately decreased or increased.

117.86. Food Storage and Processing.—In any establishment engaged in the storage, preparation, selling, serving, processing or otherwise handling of food, the waste piping from all refrigerators, ice boxes, service sinks cooling or refrigerator coils, dipper washers, glass washers, steam tables, egg boilers, coffee urns or similar equipment shall discharge into a sink or other approved indirect-connected fixture complying with the provisions of section 117.3.

117.87. Creamery and Milk House Wastes.—Waste pipes from milk vats, sterilizers, sinks or other receptacles used in creameries and milk houses, shall be of the same size and material as required for waste lines from sinks, and such wastes shall discharge into an approved separator or interceptor.

117.88. Slaughter House and Stable Wastes.—All organic wastes from tanks, processing equipment and from floors of structures occupied as abattoirs, slaughter houses and for similar uses shall be drained to an approved type of interceptor capable of removing all objectionable substances before the effluent therefrom is discharged to the sewer system. Grease interceptors shall be used where slaughter house products are processed for food and other merchandise. All liquid wastes from barns, stables and stable yards and manure pits shall be intercepted before entering the sewer by an approved trapped catch-basin. and provided with a roof vent not less than four (4) inches in diameter.

117.89. Chemical Piping and Wastes.—Chemical-waste pipes, stacks and vents and their connecting joints shall be constructed of approved corrosion-resistive materials which are unaffected by the discharge of such wastes. No corrosive liquids, spent acids, or other harmful chemicals likely to destroy or injure drain, sewer, soil or waste pipes, or which might create noxious or toxic fumes shall be discharged into the plumbing system without being diluted or neutralized by passing through an approved neutralizing device. The discharge from open gutters of industrial plants shall pass through one or more fixed metal strainers or screens of approved materials to an interceptor complying with section 117.3 before emptying into the sanitary plumbing system.

117.9. Gas-Piping Systems.

117.91. Location of Service Shut-Offs.—A service shut-off cock or valve shall be installed in an accessible location and manner. Such shut-off shall be designed for ease of operation and to preclude the core being blown out of the cock or valve by the gas pressure. The shut-off shall be installed upstream of the meter or regulator, if any. On services two and one-half (2½) inches or larger in diameter or for large buildings, places of assembly, hospitals, institutions, schools and similar buildings regardless of size the shut-off shall be located outside and maintained accessible by approved stand pipe and cover. The shut-off, its construction and location shall comply with the requirements of accepted engineering practice standards for gas transmission and distribution piping listed in appendix B.

117.92. Main Building Shut-Off.—Each gas service connection which is brought into a structure shall be fitted with a straight-way stopcock or shut-off valve, placed in an accessible position immediately inside of the wall through which such connection enters.

117.93. Meters.—Meters shall be located as near as practicable to the point of entrance of the service and preferably in the cellar or basement of the building or structure. The location shall be accessible, clean, dry, properly ventilated and free from steam or chemical fumes; and the meter shall be protected against extreme cold or heat.

117.94. Manual Control and Pilot Gas Valves.—Every supply line to a gas burner shall be provided with an approved hand operated lever-type shut-off valve installed ahead of all automatic controls at a height of approximately five (5) feet above the floor. The supply line for pilot lights shall be equipped with an independent control ahead of the main shut-off.

117.95. Piping and Fittings.—Gas piping for heating and hot water furnaces shall consist of an independent line direct from the meter of wrought iron or steel with malleable iron fittings or of copper water tube. No cast iron pipe or fittings or aluminum tubing shall be used for the main gas conduit. The piping shall be run straight without sags or traps, shall be pitched as to drain back to the riser, and from the riser to the meter or inlet; and shall be rigidly supported at intervals of not more than six (6) feet by noncombustible straps, hooks, bands or hangers. The use of lead pipe, rubber hose, or other flexible pipe, tubing or fitting shall be prohibited; except that approved flexible metallic tubing connectors shall be permitted for gas appliances which burn not more than ninety (90) cubic feet of gas per hour.

117.96. Protection from Freezing.—All gas piping shall be protected from freezing temperatures. When necessary to conceal piping in brick, stone, concrete or other masonry walls, suitable accessible recesses shall be provided and no gas piping shall be incorporated in the masonry construction.

117.97. Inspections and Tests.—Inspections shall be made of all rough piping installation authorized by the approved plans and permit before it has been covered or concealed and before any fixture or appliance has been attached thereto. After the complete installation of gas piping and before any fixtures or appliances have been attached, the system shall be subjected to an air pressure test. The tests shall be made in the presence of the building official and all test apparatus shall be furnished and the costs shall be borne by the permit holder. All piping shall be tested to withstand an air pressure fifty (50) per cent in excess of normal operating pressure of the system. In welded piping systems, the test pressure shall be not less than fifty (50) pounds per square inch applied for not less than ten (10) minutes without any loss in pressure. No piping or connections for a meter, gas fixture, gas heater or range shall be covered up until a certificate of approval has been issued by the building official.

117.98. Liquefied Petroleum Gas Piping.—Piping for liquefied petroleum gas shall be designed and installed of approved materials suitable for use on the system. Control valves shall be provided in every installation as herein specified; a main shut-off valve outside of the building on the supply side of the main connection; an auxiliary shut-off on the supply side of every appliance connection; and a relief valve with terminal discharge directly to the outer air at a point not less than five (5) feet distant from any window or other opening in the building or in adjoining structures.

117.99. Bottled Gas.—Cylinders or containers of bottled gas for domestic or commercial use shall be installed above ground outside of the building protected from mechanical injury, with approved valves, flexible connections, piping and safety devices; except that the building official may approve the installation of such containers when required for industrial purposes inside buildings or when used in construction, repair or alteration operations. Bottled gas containers shall not exceed twelve hundred (1200) gallons equivalent water capacity; and shall be tested and approved by an accredited testing authority and shall be labeled and identified in accordance with the Interstate Commerce Commission regulations.

SECTION 118.0. AIR CONDITIONING, REFRIGERATION AND MECHANICAL VENTILATION

118.1 Approved Systems.—All air conditioning, refrigerating, ventilating, cooling and air exhaust systems hereafter installed, and all alterations or additions to existing systems in buildings, and structures heretofore or hereafter erected shall be of an approved type complying with the provisions of this code and the Basic Code. Nothing herein contained shall be deemed to nullify the federal, state or municipal rules and regulations governing the storage and use of flammable and explosive gases and chemicals, or the requirements of the Interstate Commerce Commission or other federal statutes governing the transportation and use of hazardous gases, explosives and other flammable substances. The provisions of the American Standard Safety Code for Mechanical Refrigeration listed in appendix B shall be deemed to meet the provisions of this code; except as otherwise specifically provided herein.

118.11. Residential Buildings.—One- and two-family and multi-family dwellings (use groups L-2 and L-3) shall not be required to secure permits unless the refrigerating system contains more than ten (10) pounds of refrigerant or is actuated by motors or engines of one and one-half (1½) horsepower or larger.

118.12. Unit Refrigerating Systems.—All self-contained units designed either for use in the conditioned space or for use in a central system with air duct distribution which require no external construction other than water or electrical connections shall be of an approved type and the gas, plumbing and electric connections shall conform to the requirements of sections 117 and 121. In buildings of residential, business, commercial and industrial groups no permit shall be required for the installation of self-contained unit refrigerating systems with capacities of not more than six (6) pounds of group 1 refrigerants.

118.13. Site Assembled Systems.—All built-up and site assembled installations used either as direct or indirect systems with group 2 or group 3 refrigerants shall have all parts containing refrigerants enclosed in vapor tight and fire-resistive machinery rooms or located in accessory structures not connected to the main buildings in accordance with section 119.41.

118.14. Certificate of Approval.—A permit shall be required for all new installations and for alterations or additions to existing installations or where required for the remedying of existing defective installations, except as herein provided. No refrigerant other than provided for in the American Standard Safety Code and specified in the certificate of approval shall be employed in the system.

118.15. Tests.—Every part of a refrigerating or air conditioning system containing the refrigerant shall be tested for tightness by the manufacturer at not less than the minimum specified test pressures; and no air conditioning, refrigerating or ventilating system requiring a permit shall be operated or permitted to be operated until it has been approved by the building official. All tests shall be conducted in accordance with the American Standard Safety Code and the approved rules adopted thereunder.

118.16. Existing Approvals.—Existing air conditioning, refrigerating and ventilating equipment heretofore legally installed may be continued in use, providing the public safety is not endangered thereby and the system is maintained in a safe operating condition as required by the building official. If the continued use of existing equipment is unsafe, he shall order such use to cease until all defects are remedied.

118.17. Power of Condemnation.—Whenever a system or any part thereof is found to be unsafe to life or property, it shall be forthwith condemned and no such system shall thereafter be restored to use until it has been made safe and approved for use.

118.18. Inspections and Certificates.—All systems requiring permits shall, upon their completion, be inspected by the building official. If found safe and in conformity to the provisions of this code, he shall issue a certificate which shall be kept posted in a conspicuous location. Refrigerating systems in buildings of the public assembly or institutional use groups shall be inspected periodically. Upon inspection or reinspection of an air conditioning, refrigerating, or ventilating system, any defects or deficiencies in any part of the system which require repair to insure safe operation shall be immediately rectified before the system is returned to use.

118.19. Housekeeping.—All air conditioning and refrigerating systems shall be operated and maintained in a clean and orderly manner, free from accumulations of dust, oily waste or other debris and all piping and machinery shall be kept readily accessible at all times for inspection and repair. Ducts, cooling and heating coils shall be kept clean, and unit filters shall be cleaned or renewed to insure unimpeded air flow and fire safety.

118.2. Accidents.—The owner, lessee or person in charge of air conditioning or refrigerating systems shall immediately notify the building official of each and every accident to a person involving medical attention or damage to apparatus or property of one hundred (100) dollars or more on or about or in connection with the installation; and he shall afford the building and other authorized administrative officials every facility for investigation. The removal of any part of the damaged construction or operating mechanism from the premises is forbidden until permission has been granted by the building official.

118.3. Classification of Refrigerants.—Refrigerants shall be classified in accordance with the Standard Safety Code.

118.4. Location and Installation of Systems.—No air conditioning or refrigerating systems shall be installed in public hallways, lobbies, stairways, or other exitways of any building, or in elevator or dumbwaiter shafts, except that a direct sealed unit system containing not more than six (6) pounds of group 1 refrigerant may be installed in exit corridors provided free exit passage is not obstructed thereby and such installation is approved by the building official. Refrigerant piping crossing passageways or corridors in any building shall be erected with not less than seven (7) feet clearance above the floor; and no such piping shall be located in any duct work of the system.

118.41. Machine Room Enclosure.—Machine rooms for all air conditioning and refrigerating systems containing fifty (50) pounds or more of group 2 and group 3 refrigerants shall be enclosed with vapor-tight construction of not less than two (2) hours fire resistance with one and one-half (1½) hour self-closing fire doors or the approved labeled equivalent complying with section 119.8. No openings shall be provided that will permit the escape of the refrigerant to other parts of the building. The exit door shall open directly to the outer air, or the machinery room shall be provided with a vestibule with self-closing fire door at both entrance and exit.

118.42. Emergency Ventilation.—The machinery room shall be ventilated to the outer air, either by windows or approved mechanical exhaust systems as specified in the standard. No flame producing device or hot surfaces at a temperature above eight hundred (800) degrees F. shall be permitted in the machine room and all electrical equipment shall conform to the requirements of the National Electrical Code for electric installations in hazardous locations.

118.43. Quantity of Refrigerant.—Not more than three hundred (300) pounds of refrigerant shall be stored in approved containers in the machinery room. Quantities in excess of three hundred (300) pounds shall be stored in a separately enclosed accessory room or building enclosed in three (3) hour fire-resistive construction.

118.44. Disposal of Waste Refrigerant.—The containers into which refrigerants are discharged or withdrawn from a refrigeration system shall comply with the Interstate Commerce Commission regulations and specifications for shipping containers. When refrigerant is added to a system, except in unit systems containing not more than six (6) pounds of refrigerant, it shall be charged on the low pressure side; and no containers shall be left connected to a system except while charging or withdrawing refrigerant. Refrigerants withdrawn from a system shall be transferred in the approved containers and shall not be discharged into any sanitary sewer or plumbing system, but shall be disposed of in accordance with the provisions of section 117.3.

118.5. Equipment and Operation of Systems.

118.51. Blower Shut-Off.—All ventilating and air conditioning systems using fans or blowers shall have an approved manually operated blower shut-off switch in an accessible location for quickly closing down the fan in case of fire. In recirculation systems servicing more than one (1) story of a building, or more than one (1) fire area of a single story, the fan shall be arranged to shut down automatically if the air temperature reaches one hundred and twenty-five (125) degrees F. in any part of the system.

118.52. Smoke Detector.—When the life safety of any use and occupancy is exceptionally hazardous or when required for automatic operation of exhaust systems, all mechanical ventilation and air conditioning systems shall be provided with an approved smoke detector.

118.53. Emergency Valve and Tank.—All refrigerating systems employing more than one hundred (100) pounds of group 2 or group 3 refrigerants shall be provided with an emergency tank equipped with a quick-acting, readily accessible and identified gate valve to purge the system of all refrigerant in the event of fire, complying with section 403 of the Basic Building Code.

118.54. Steam and Hot Water Heating Equipment.—The installation of all steam and hot water apparatus in air conditioning systems shall comply with the requirements of section 113 and 114 for piping, flues and flue connections. Direct heating units when used in air conditioning systems shall be equipped with an approved temperature limit-control device. The steam pressure in heating coils of all air conditioning systems shall not exceed fifteen (15) pounds per square inch gage pressure.

118.55. Piping and Valves.—All piping, tubing and valves used in construction and installation of a refrigerating or air conditioning system shall conform to accepted engineering practice governing pressure piping and shall be suitable for the refrigerant used therein, and no construction materials shall be used that might deteriorate under the chemical action of either the refrigerant or lubricating oil, or combined action of both. Brass and copper pipe and hard copper tubing shall comply with sections 117.76, 117.77, and 117.78. Vertical refrigerating piping extending through two (2) or more stories shall be enclosed in two (2) hour fire-resistive shaft enclosures with vent relief above the roof; unless erected on the exterior of the building in other than interior courts or air shafts. All insulated and uninsulated refrigerant piping other than piping located on the exterior of the building or structure, or when located in a flue vented to the outer air, shall be installed so as to be accessible for visual inspection and maintenance, except when required to be protected against mechanical injury, or when located in the enclosed cabinet of an approved refrigerating unit. In systems operating on group 1 refrigerants, the piping may be carried through floors provided it is enclosed in fire-resistive ducts or shafts vented to the outside air.

118.56. Hangers and Supports.—All equipment piping, tubing and other accessories containing refrigerant shall be fully supported in an approved manner by hangers and supports of metal or other approved noncombustible material and such supports or hangers shall be used for no other purpose.

118.57. Soldered Joints on Copper Tubing.—Soldered joints on copper tubing used in all refrigerating systems in buildings for institutional and assembly uses (use groups F and H) and in refrigerating systems containing more than twenty (20) pounds of refrigerant gas in buildings of other use groups shall be fabricated using solders or alloys with melting points of not less than one thousand (1000) degrees F.

118.58. Discharge Lines.—Discharge lines from condensers and other equipment shall not be directly connected to the waste or sewer system but shall discharge over and above the rim of a tripped and vented plumbing fixture or other interceptor or into a separate storm water sewer as provided in section 117.

118.59. Water Connections.—Discharge water lines from condensers shall be connected to prevent siphoning into potable water supply lines and no water used for removing heat from a refrigerating system shall be discharged into any water supply directly or indirectly intended for domestic purposes or human consumption.

118.6. Air Inlet and Outlet Openings.

118.61. Exterior Openings.—Fresh air intakes with less than thirty (30) feet exposure distance to openings in adjoining walls or buildings shall be protected with approved automatic fire shutters, curtains or other approved opening protectives complying with section 118.9. Exterior fresh air intake and exhaust openings when located on a street or alley lot line shall be installed not less than twelve (12) feet above grade; and all intakes shall be protected by approved corrosion-resistive screens. Exterior exhaust openings shall be provided with approved protecting guards, covers or other approved means of preventing the creation of a nuisance; and shall not circulate air downward in such manner as to strike pedestrians. The discharge outlet shall be located not less than twelve (12) feet above grade and not less than twenty (20) feet horizontally from a fire escape, exterior stairway or other required exitway.

118.62. Interior Openings.—Interior air inlet and outlet openings within buildings and structures shall be located not less than three (3) inches above floors, except that approved mushroom type inlets may be located under the seats in places of public assembly equipped with fixed seats.

118.7. Duct Construction and Supports.—All ducts shall be constructed of approved, noncombustible, corrosion-resistive materials in accordance with the requirements of section 113.6. Ducts may be independently erected or may be incorporated in the walls or other parts of the structure, provided that the portion of the structure forming the duct enclosure meets the minimum requirements for strength and fire resistance of table 5. Ducts shall be made reasonably air-tight throughout, without openings other than those required for the proper operation and maintenance of the air conditioning or ventilating system. Ducts and all parts of the duct system shall be substantially supported and securely fastened to the structural members of the building with supports of approved, durable, noncombustible materials.

118.71. Plenum Chambers.—Plenum chambers shall conform to all the minimum requirements for duct systems, and when such chambers are enclosed in walls or partitions, the enclosure shall be constructed in accordance with the requirements of section 112 for enclosure walls, but in no case shall the fire-resistance rating be less than two (2) hours.

118.72. Return Ducts.—Return ducts, other than vertical, shall be so constructed that the interior is accessible to facilitate the removal of possible accumulations of dust and other combustible and flammable matters. Where corridors or hallways are used as return ducts, an approved smoke detector or other device shall be provided to stop the exhaust fan automatically and instantaneously in the presence of smoke. The louvres provided for the transmission of air to and from air-conditioned spaces to such corridors shall be arranged to close automatically after stopping of the fans and shall be equipped with auxiliary manually operated closing devices which can be readily closed in emergency.

118.73. Supply Ducts.—Supply ducts, other than vertical, shall conform to the requirements for return ducts, except when the entire air supply passes through either a water spray or approved filter as specified in section 118.8.

118.74. Location of Ducts.—All ducts shall be installed so that they will not vitiate the strength of any structural member and so as not to be subject to mechanical damage. Metal ducts shall be installed not nearer than two (2) inches to any combustible construction unless protected by approved insulating material complying with section 118.75.

118.75. Linings and Coverings.—Only approved noncombustible materials shall be used for duct lining; nor shall combustible coverings be used on the outside of ducts carrying air at temperatures greater than one hundred and seventy-five (175) degrees F. All coverings shall be adequate to prevent a temperature of more than two hundred and fifty (250) degrees F. on the exterior exposed surface.

118.76. Firestopping.—The firestopping of floors, partitions and walls shall not be destroyed where ducts pass through floors, ceilings, walls, or partitions, nor shall the effectiveness of the fire protection be impaired around structural members as required in section 103.1 and table 5 of the Basic Building Code.

118.77. Flammable Residues.—Ducts for exhaust ventilation and air conditioning systems which discharge or contain flammable vapors, dust or other solid residues shall extend to the exterior of the structure in the most direct manner possible and shall not pierce floors except when enclosed with construction of the required fire resistance as defined by the fire grading in table 29; nor shall such ducts transporting flammable matters extend through fire walls, nor shall they be incorporated in the structural elements of the building. Such discharges shall be piped directly to the outside of the building; and the discharge outlet shall be located to comply with section 118.6.

118.8. Air Filters.—Air filters shall be of approved types, constructed of flame-resistive materials. The flash point of liquid adhesive coating used on air filters shall be not less than three hundred and fifty (350) degrees F. The use of oil filters that may be subject to flowing or dripping oil shall be prohibited.

118.9. Fire Dampers and Opening Protectives.

118.91. Fire Division Walls.—An approved fire door or an approved automatic fire shutter complying with the provisions of section 119.8 shall be provided at each side of a fire division wall which is pierced by a duct of an air conditioning or ventilating system. Such opening protective shall be installed so as to be readily accessible for inspection and repair.

118.92. Fire Dampers.—When fire doors are not practical, approved automatic fire dampers shall be constructed of noncombustible materials and installed in the prescribed locations complying with the Standard Safety Code for Refrigeration.

SECTION 119.0. FIRE SAFETY AND FIRE PROTECTION

119.1. Fire Walls.—All fire walls for the purpose of subdividing a building into limited fire areas, complying with table 6 of the Basic Building Code, or which separate two (2) or more buildings to restrict the spread of fire shall be ground-supported, or shall be so constructed as to be self-supporting in the event of collapse of adjoining construction on one side. In fireproof construction, the fire walls may be supported on columns and girders protected to afford the same fire resistance as the wall; and when offset, the floor construction shall be of the same fire resistance required for the fire wall. The fire-resistance ratings of fire walls shall conform to the requirements of table 5, but in no case shall such fire resistance be less than two (2) hours, nor in any case less than the fire grading of the use group specified in table 30.

TABLE 30.—ABC FIRE HAZARD CLASSIFICATION

Use group	Fire grading in hours
1- and 2-family dwellings	¾
Multi-family dwellings	1½
Hotels, boarding and lodging houses and dormitories	2
Institutional	2
Assembly	3
Business	3
High hazard	4 or more

For comprehensive table, see table 16, Basic Building Code.

119.11. Hollow Fire Walls.—When wood or other combustible structural members frame into hollow masonry fire walls or walls built of hollow masonry units, all spaces shall be filled solidly for the full thickness of the wall and for a distance of not less than four (4) inches above and below and between the structural members with concrete or other noncombustible materials.

119.12. Combustible Insulation.—Fire walls may be faced with cork, fiber board or other combustible insulation materials if cemented directly to the fire wall without intervening air spaces and protected on the exposed surface with an approved noncombustible veneer or shall be treated to be noncombustible.

119.13. Height of Fire Walls.—Except as herein provided, fire walls shall extend not less than two (2) feet eight (8) inches above the roof with flashing on both sides and shall be coped with weather-resisting and noncombustible materials. In buildings of the residential use group, fire walls may be stopped six (6) inches above the top of the roof sheathing, provided the junction of wall and roof framing is thoroughly firestopped and no combustible materials extend through the wall; and when the roof construction has a fire-resistance rating not less than that of the fire grading for the specific use, the fire wall may stop at the roof level if completely firestopped.

119.14. Frame Construction.—All fire walls in frame construction shall extend through exterior walls and other intersecting walls of less fire resistance than the fire wall to the outside of all combustible wall and roof sheathing.

119.2. Fire Divisions.—Fire divisions in buildings of mixed occupancies to establish complete separation both horizontally and vertically between such adjoining uses in any one building or structure shall be constructed to develop the fire-resistance ratings corresponding to the fire grading on both sides.

119.21. Business Separation.—In all buildings of the residential use group in which retail business is conducted in the first story, subject to the restrictions of the zoning laws, the ceilings and enclosing partitions between the business and dwelling portions and the exitways from the dwelling areas shall be protected to afford not less than three-quarter (¾) hour fire resistance.

119.22. Party Walls.—Party walls erected between two (2) buildings with flat roofs shall extend not less than six (6) inches above the roof and shall be flashed and coped as for fire walls. In buildings and structures of the residential use group, the roofs of which slope at an angle of thirty (30) degrees or more to the horizontal, party walls may stop at the level of the top of the roof boards provided no combustible material passes through the wall and the junction of roofs and wall is completely firestopped as required in section 119.9. The fire-resistance rating of party walls not required to restrict the allowable areas specified in table 6 of the Basic Building Code for each use group and type of construction shall conform to the fire grading established for the use of greatest fire hazard separated thereby as prescribed in table 30. Party walls in frame construction may be constructed of wood studs protected on both sides and filled with noncombustible materials to afford the equivalent fire-resistance rating of the use group of highest hazard separated thereby.

119.3. Separation and Bearing of Structural Members.

119.31. Masonry Wall Construction.—All wood and other combustible floor joists and roof rafters framing into masonry wall shall be cut to a bevel of three (3) inches in the depth and shall project not more than four (4) inches into the wall. The distance between the imbedded ends of adjacent beams or joists entering the wall from opposite sides shall be not less than four (4) inches.

119.32. Heavy Timber Construction.—Wood girders shall have not less than eight (8) inches of masonry between their ends and the outside face of the wall and not less than eight (8) inches of masonry between adjacent girders entering the wall from opposite sides. Such girders shall be supported on wall plates, hangers of steel or other noncombustible supports or boxes which are designed to be self-releasing in the event of fire.

119.4. Hazardous Spaces.—In all buildings other than one- and two-family dwellings, boiler rooms, incinerator rooms, storage rooms for flammable contents or ash storage shall be enclosed with not less than two (2) hour fire-resistive construction.

119.41. Basement Ceilings.—In all buildings other than one- and two-family dwellings of frame or unprotected ordinary construction, with habitable or occupiable rooms or basements below grade, the first floor construction shall be protected with ceilings of not less than three-quarter (¾) hour fire-resistance rating and as herein provided:

119.42. Attached Private Garages.—Attached private garages shall be constructed as specified in section 107.7.

119.43. Basement Recreation Rooms.—Basements used as recreation and playrooms in multi-family dwellings shall be protected to comply with section 108.28.

119.44. One- and Two-Family Dwellings.—The ceiling over any furnace or other heating equipment shall be protected to comply with section 114.32.

119.45. Places of Assembly.—No dance hall, skating rink or similar places of public assembly for amusement, entertainment or service of food or refreshment shall be located in stories or rooms below grade unless the first floor is of fire-resistive construction with a fire-resistance rating of not less than one and one-half (1½) hours and not less than two (2) approved remote exitways leading to the street are provided enclosed in not less than three-quarter (¾) hour fire-resistive partitions as required in section 108.4.

119.5. Roof Coverings Within the Fire Limits.—Within the fire limits, all roof coverings shall be asbestos, brick, concrete, metal, slate, tile, prepared asphalt or laminated felt roofing finished with asphalt, slag, gravel or similar noncombustible moisture-resistant materials or approved combinations of such materials, classified as class 1, class 2 or class 3 roofings under the Basic Building Code.

119.51. Combustible Decking.—Unless attached directly to noncombustible framework, all roof coverings shall be applied to a closely fitted deck; except as herein provided for wood shingles.

119.52. Fire and Party Wall Restrictions.—No wood planking, sheathing or other combustible decking when used in roof construction shall extend through or over a party wall or fire wall or across a lot line.

119.53. Roof Insulation.—The use of cork, fiber board and other roof insulation of similar combustible characteristics complying with section 904.4 of the Basic Building Code shall be permitted, provided it is attached directly to the roof decking or sheathing and is covered with an approved roof covering.

119.6. Roof Coverings Outside the Fire Limits.—Roof coverings that are classified as class 4 under the Basic Building Code, including wood shingles, shall be permitted for use on one- and two-family dwellings of frame construction not exceeding two (2) stories and attic or thirty-five (35) feet in height and four thousand (4000) square feet in area when the distance of the building from property lines, or from the opposite sides of public spaces or from any other building is not less than twelve (12) feet; and on private garages and other similar accessory buildings located on the same lot with a dwelling; and on one (1) story storage buildings of low or moderate fire hazard not more than six thousand (6000) square feet in area when separated not less than twenty (20) feet from lot lines or from any other building or structure.

119.7. Wood Shingles.—Approved edge-grain wood shingles may be used as roof covering as provided in section 119.6 when nailed firmly with aluminum, copper, zinc, zinc coated or other approved corrosion-resistive nails, in accordance with manufacturers' standards, but with not less than two (2) nails to each shingle. The length of shingle exposed to the weather shall be not more than herein specified:

16 inch shingle..............................	5 inch exposure
18 inch shingle..............................	5½ inch exposure
24 inch shingle..............................	7½ inch exposure

119.8. Fire-Resistive Opening Protectives.—Opening protective assemblies including the frames, hardware, installation and operation which comply with the standards and accepted practice including shop inspection of the Underwriters' Laboratories or other accredited testing authorities shall be deemed to meet the requirements of this code for their recommended and approved locations and uses.

119.81. Fire Doors.—Where door openings are required to be protected with approved fire doors, such door assemblies including the hardware shall be tested and approved for the specified time-temperature performance under the standard fire test procedure with not less than the fire-resistance ratings prescribed in table 31; or shall be the approved labeled equivalent recommended for the specified location and use.

TABLE 31.—TIME-TEMPERATURE PERFORMANCE OF FIRE DOORS

Use	Fire-resistance rating in hours
Fire walls and fire divisions of 3-hr. or more construction	3
Fire walls and fire partition of 2-hr. construction	1½
Elevator enclosures and fire towers	1½
Stairway and exitway enclosures	¾
Fire-resistive partitions of 1-hr. or less rating	¾

Note: In residential and business buildings not more than three (3) stories or forty (40) feet in height with an occupancy load of not more than forty (40) below and seventy-five (75) above grade, solid core doors of the flush type, one and three-quarter (1¾) inches thick may be accepted in exitways and in openings from hotel rooms to the corridors. Plywood face veneers not more than one twenty-eighth (1/28) inch thick shall be permitted on such doors and other opening protectives.

119.82. Fire Windows.—Where approved fire windows or fire shutters are required in exterior walls, the complete assembly including frames, glazing and hardware shall develop a three-quarter (¾) hour fire-resistance rating or shall be the approved labeled equivalent. Fire shutters of the rolling type shall be of approved counter-balanced construction that can be readily opened from the outside.

119.83. Fire Dampers.—Automatic or self-closing fire dampers of not less than No. 16 U.S. gage shall be provided in ducts, chutes, belts and conveyors where they pass through fire division partitions on both sides of the wall and at floor openings as provided in section 118.9. They shall be so designed as to close effectively the opening with a complete firestop.

119.9. Firestopping.—Firestopping shall be designed and installed to close all concealed draft openings and to form effective fire barriers against the spread of fire in all sub-divisions of any one story and between all stories of the building; and all open spaces in the structural frame, including among others the locations herein specified; and all other openings that would permit the free travel of flame shall be effectively firestopped. Such firestopping shall be constructed of formed steel of not less than No. 20 U.S. gage or other approved noncombustible materials effectively secured in place; except that in open spaces of wood-frame construction, firestops of two (2) thicknesses of one (1) inch lumber with broken lap joints or of two (2) inch lumber installed with tight joints shall be permitted.

119.91. Wood Stud Walls.—All wood stud walls and partitions shall be firestopped for the full depth of floor and roof framing at each floor level and between the ceiling of the top story and the roof space. When such spaces are required to be ventilated as prescribed in sections 111.8 and 115.3, the details of firestopping shall be approved by the building official.

119.92. Furred Spaces.—All furred spaces of frame walls and studded off spaces of masonry walls shall be firestopped at maximum intervals of eight (8) feet both horizontally and vertically.

119.93. Sliding Doors.—Where sliding doors are pocketed in partitions, such pockets shall be completely firestopped on all sides.

119.94. Stairways.—Firestopping shall be provided between stair stringers at least once in the middle portion of each run and at the top and bottom and between studs of frame construction along and in line with the run of the stairs.

119.95. Pipes and Ducts.—The space around pipes, ducts or power shafting in floor or partition construction which is penetrated by such equipment shall be firestopped by filling with noncombustible materials or by close-fitting metal caps at ceiling and floor line and at both sides of the partition; or such openings shall be otherwise protected to prevent the passage of flame, hot gases and smoke.

119.96. Combustible Trim and Finish.—In all fire-resistive construction and where permitted in exitways all combustible slow-burning fire-retardant wall and ceiling trim, wainscoting, acoustical and insulation treatments and finish on masonry or other fire-resistive wall and ceiling construction shall be applied directly to the noncombustible base or the space behind such trim and finish shall be filled solidly with noncombustible materials or firestopped in areas of not more than ten (10) square feet and no dimension more than eight (8) feet vertically or horizontally; except that combustible trim and finish shall be prohibited in public hallways and exitways of buildings of the institutional use group which are more than two (2) stories in height or having sleeping accommodations for more than twenty-five (25) persons.

119.97. Fireplaces.—The open spaces between backs and sides of chimneys and fireplaces and combustible framing shall be firestopped with noncombustible materials.

119.98. Exterior Cornices.—Exterior cornices of wood construction as provided in section 112.81 shall be fully firestopped or shall be built noncontinuous and completely separated between adjoining buildings.

119.99. Inspection.—No firestopping shall be concealed or covered until it has been inspected and approved by the building official.

SECTION 120.0. ELEVATOR, DUMBWAITER AND CONVEYOR EQUIPMENT

The design, construction, installation, maintenance and operation of all elevators, dumbwaiters, moving stairways and conveyors for moving persons, materials and merchandise hereafter installed, relocated or altered in buildings and structures shall comply with the provisions of the Basic Building Code and the Safety Code for Elevators, Dumbwaiters and Moving Stairways listed in appendix B. Special hoisting and elevating equipment and amusement devices shall be subject to special approval of the building official. Hoistway enclosures shall comply with section 115.9.

120.1. Tests and Inspections.—Acceptance tests and inspections shall be required of all new installations and major alterations as prescribed in section 1603 of the Basic Building Code.

120.2. Moving Stairways.—All moving stairways shall be enclosed or the openings shall be protected with an approved exhaust system with water curtain thermostatically controlled to operate simultaneously with the detection of fire or with an approved power operated fire shutter having a one and one-half (1½) hour fire-resistance rating as required in sections 522, 622 and 1622 of the Basic Building Code.

120.3. Existing Elevators.—All existing passenger and freight elevator installations shall comply with the provisions of section 1606 of the Basic Building Code.

SECTION 121.0. ELECTRIC EQUIPMENT AND WIRING

All new electric wiring for light, heat and power service equipment, for radio and television receiving systems, and all alterations or extensions to existing wiring systems in buildings and structures shall comply with the National Electrical Code listed in appendix B.

121.1. Exceptions.—The provisions of this code shall not be applied to electrical power supply companies or communication agencies in respect to the generation, transmission, or distribution of electric power and light, to public communication transmission systems, to operation of signal systems used exclusively by public service agencies, to installation or equipment used by railway utilities and public carriers or to radio transmission systems, other than the equipment and wiring for power supply and the installation of radio towers and antennae whether erected on buildings or on the ground.

121.2. Electric Installation Standards.—Conformity of installations of electrical equipment to the National Electrical Code and National Electrical Safety Code shall be prima facie evidence that such installations and equipment are reasonably safe for use in the service intended and in compliance with the provisions of this code.

121.3. Electric Equipment Standards.—The materials, fittings, appliances, devices and other equipment listed in publications of inspected electrical equipment of the Underwriters' Laboratories, Inc., and other accredited authoritative agencies and testing organizations and installed in accordance with the recommendations of the approved report shall be accepted as meeting the requirements of this code.

121.4. Certificates of Approval.—No electric wiring system shall be used or current supplied for light, heat or power in a building or structure until the required certificate of inspection and approval has been issued by the building official except for temporary current for a part installation or for testing purposes.

SECTION 122.0. FIRE PREVENTION AND FIRE EXTINGUISHING EQUIPMENT

The installation of fire alarms, fire communication systems, fire extinguishing equipment and the organization of private fire brigades and fire drills in all buildings and structures shall comply with the requirements of this section and the Basic Building Code.

122.1. Approved Devices.—The building official shall accept the label or listing in the publication of tests and approvals of inspected fire protection equipment and materials of accredited, authoritative agencies cited in appendix A when installed in accordance with the limitations of the approvals.

122.2. Standpipe Fire Lines.—All buildings hereafter erected or altered which are designed for use other than one- and two-family dwellings, or which are not already equipped with two and one-half (2½) inch or larger standpipes, shall be provided with an approved standpipe complying with the provisions of the Basic Building Code, as herein specified:

122.21. Buildings Over Two Stories.—When more than two (2) stories or more than thirty (30) feet in height and more than ten thousand (10,000) square feet in area; except that when not of a high hazard use and the building is equipped with an approved sprinkler system not otherwise required, the requirement for a standpipe shall be waived.

122.22. Hose Connections.—Standpipes shall be equipped in every story with two and one-half (2½) inch hose connections conforming to the municipal fire department standard and hose of sufficient length to reach all parts of the floor area, within thirty (30) feet, but not more than one hundred and twenty-five (125) feet in length. In hotels and institutional buildings and in business buildings designed for office use, one and one-half (1½) inch hose may be permitted when installed with a reducer coupling on the two and one-half (2½) inch outlets.

122.23. Exceptions.—Buildings of fire-resistive construction equipped with an approved automatic sprinkler system not otherwise required by the provisions of this code shall be exempt from the standpipe requirement.

122.24. First Aid Standpipe.—First aid standpipe firelines for use of the occupants of the building or of the trained fire brigade shall be provided in buildings of the use groups herein specified. The system shall consist of not less than two and one-half (2½) inch risers with one and one-half (1½) inch hose so that every part of the floor area requiring protection can be reached within twenty (20) feet with not more than seventy-five (75) feet of hose.

Business buildings in which flammable materials, products or other hazardous conditions are present and which are more than two (2) stories or thirty (30) feet in height and more than three thousand (3000) square feet in undivided floor area, except when such buildings are equipped with an approved automatic sprinkler system not otherwise required;

Institutional buildings, including hospitals, asylums, places of detention and hotels and dormitories which are more than two (2) stories in height with sleeping accommodations for more than twenty-five (25) occupants;

Assembly buildings, including theaters, night clubs, assembly halls, lecture halls and recreation centers with an occupancy load of more than three hundred persons.

122.3. Automatic Sprinklers.—Buildings of the use groups herein specified shall be equipped with an automatic sprinkler system complying with the provisions of the Basic Building Code and the applicable standards listed in appendix B;

Public garages with a storage capacity of twenty (20) or more automobiles which are located in buildings in which the upper stories are designed for other uses;

Passenger terminals and bus garages which are more than two (2) stories or thirty (30) feet in height;

Mercantile buildings which are more than twenty thousand (20,000) square feet in area on any story above or below grade when of fireproof or one and one-half (1½) hour protected noncombustible construction, or more than ten thousand (10,000) square feet in area when of three-quarter (¾) hour protected noncombustible or mill-type construction, or more than seven thousand five hundred (7500) square feet in area when of unprotected noncombustible or ordinary construction, or more than six thousand (6000) square feet in area of frame construction;

Unpierced enclosure buildings which are designed for industrial occupancy except refrigerating plants and buildings or parts thereof used for the cold storage of meats and other food products; and

Unlimited area buildings to comply with section 107.5; except that buildings used for the storage or manufacture of noncombustible products shall be exempt from the requirement of automatic sprinklers.

122.31. Partial Protection.—All parts and areas of residential, institutional and assembly buildings, other than one- and two-family and multifamily dwellings, used for storage or workshop purposes which involve combustible or flammable materials shall be equipped with an approved automatic sprinkler system of one source supply. When approved by the building official, such partial systems used to protect isolated hazardous locations and unenclosed stairways in existing buildings, may be serviced from the building water supplies, if adequate to service such sprinkler heads for not less than twenty (20) minutes at a pressure of fifteen (15) pounds per square inch at the topmost head.

122.32. Approved Systems.—Only approved sprinkler heads, fittings, connections, valves, piping and water supplies shall be used complying with the provisions of the Basic Building Code. Devices and materials listed in publications of inspected fire protection equipment of accredited insurance and testing agencies listed in appendix A and appendix B shall be deemed to comply with the requirements of this code.

122.4. Standby Equipment.—Approved hand-operated auxiliary fire extinguishing equipment including water barrels, buckets, hand fire extinguishers, chemical engines, axes, hooks, ladders and similar appliances shall be installed in the corridors and other locations involving fire hazard of all buildings of the use groups herein specified. Such auxiliary emergency equipment shall be installed in readily accessible locations for the use of the occupants or the trained fire brigades. When enclosed in cabinets, they shall be equipped with readily-opened, keyless doors, or readily-broken glass access panels.

Theaters and assembly halls shall be provided with not less than two (2) approved extinguishers in the stage area where movable scenery is employed; not less than one (1) such extinguisher on permanent stages or platforms without scenery or stage equipment; not less than one (1) such extinguisher in each tier of dressing rooms; and one immediately outside of the entrance to every permanent motion picture booth.

Schools and lecture halls shall be provided with not less than one (1) approved extinguisher for each three thousand (3000) square feet on each occupied floor and not less than one (1) in each laboratory, shop or other vocational room.

Hotels and dormitories more than two (2) stories in height, not equipped with standpipes or automatic sprinklers, shall be provided with at least one (1) fire extinguisher on each floor at the stairway landing and in the public hallway.

Construction operations shall be protected during construction with at least one (1) fire extinguisher in each storage shed and on each run of combustible scaffolding forty (40) feet or more in height.

122.5. Central Station Alarm Systems.—Fire alarm transmission systems shall be provided with connection to a central local station, to an approved proprietory supervising office, or with a direct fire department connection in all institutional and hotel buildings more than two (2) stories or twenty-five (25) feet in height or in which sleeping accommodations are provided for more than twenty-five (25) persons, in all public assembly buildings with an occupancy load of more than three hundred (300) persons, and in all nursery buildings accommodating more than thirty (30) children above the first floor.

122.6. Interior Fire Alarms and Fire Brigades.—Approved interior fire alarm signal systems with or without the conduct of fire drills shall be provided in all buildings of the following use groups;

Business buildings more than two (2) stories in height, not equipped with an approved automatic sprinkler system in which more than twenty-five (25) persons are engaged in manufacturing above the first floor and all industrial buildings with unpierced enclosure walls more than one (1) story in height;

Mercantile buildings: all department stores more than two (2) stories in height which are not equipped with an approved automatic sprinkler system;

School and nursery buildings: all school and nursery buildings with provision for more than thirty (30) children above the first story;

Hospitals and asylums: all hospitals, asylums, and similar institutional buildings accommodating more than fifteen (15) patients above the first story; and in

Residential buildings: all hotels, lodging houses, dormitories and bath houses having more than fifteen (15) sleeping rooms or accommodating more than fifty (50) persons above the first floor.

122.61. Fire Drills.—Systematic supervised fire drills shall be conducted in factory buildings, schools and all other buildings requiring interior fire alarm signal systems under the provisions of this code, except in buildings of the residential use groups. Such drills shall be conducted simultaneously throughout the building at least once every thirty (30) days. A complete report and written record of the procedure shall be filed with the administrative authority.

122.62. Fire Brigade and Watchman Service.—In hotel, institutional and industrial buildings requiring interior fire alarm signal systems, organized fire brigades or supervised watchman's services shall be provided, trained and instructed in the operation of all auxiliary fire fighting and protective equipment to insure minimum interference with the use of exitways while occupants are discharging from the building and to patrol all floors and areas of the building other than private guests' quarters in hotels at fixed periodic intervals during the day and night.

APPENDIX A

ACCREDITED AUTHORITATIVE AGENCIES

AMA	Acoustical Materials Association
ACI	American Concrete Institute
ACRMA	Air Conditioning and Refrigeration Machinery Association (Functions now assumed by Air Conditioning and Refrigeration Institute)
AGA	American Gas Association
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ARI	Air Conditioning and Refrigeration Institute
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASHVE	American Society of Heating and Ventilating Engineers
ASME	American Society of Mechanical Engineers
ASRE	American Society of Refrigerating Engineers
ASTM	American Society for Testing Materials
BOCA	Building Officials Conference of America, Inc.
CPA	Clay Products Association
DFPA	Douglas Fir Plywood Association
FML	Factory Mutual Laboratories
FPL	Forest Products Laboratory
GA	Gypsum Association
HHFA	Housing and Home Finance Agency
HPI	Hardwood Plywood Institute
IAEI	International Association of Electrical Inspectors
IBI	Insulation Board Institute
IES	Illuminating Engineering Society
MCA	Manufacturing Chemists' Association, Inc.
MLMA	Metal Lath Manufacturers Association
NAHB	National Association of Home Builders
NBBI	National Board of Boiler and Pressure Vessel Inspectors
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards, Department of Commerce
NCMA	National Concrete Masonry Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NLA	National Lime Association
NLMA	National Lumber Manufacturers Association
NMDA	National Metalclad Door Association
NMWA	National Mineral Wool Association
NWAHACA	National Warm Air Heating and Air Conditioning Association
PCA	Portland Cement Association
PCBOC	Pacific Coast Building Officials Conference
PHMI	Prefabricated Home Manufacturers Institute
PI	Perlite Institute
PMMA	Plastic Material Manufacturers Association (Functions now assumed by Manufacturing Chemists' Association)
SBCC	Southern Building Code Congress

SCPI	Structural Clay Products Institute
SJI	Steel Joist Institute
ULI	Underwriters Laboratories, Inc.
USDC	United States Department of Commerce
USFS	United States Forest Service
VI	Vermiculite Institute
WRI	Wire Reinforcing Institute

Note: See appendix A, Basic Building Code.

APPENDIX B

ACCEPTED ENGINEERING PRACTICE STANDARDS

Automotive Lifts	USDC CS 142—1951
BOCA Basic Code	BOCA—1954
Boiler Code and Unfired Pressure Vessels	ASME—1952
Building Code Requirements for Light and Ventilation	ASA A 53.1—1946
Building Code Requirements for Mansonry	ASA A 41.1—1953
Building Code Requirements for Minimum Design Loads	ASA A 58.1—1945
Building Code Requirements for New Dwelling Construction	NBS BMS 107—1947
Building Code Requirements for Gypsum Plastering	ASA A 42.1—1950
Building Code Requirements for Portland Cement Stucco	ASA A 42.2—1946
Building Code Requirements for Portland Cement Plastering	ASA A 42.3—1946
Building Exits Code	ASA A 9.1—1953
Clay Flue Linings	ASA A 62.4—1947
Coordination of Dimensions of Building Materials	ASA A 62.1 and A 62.2—1945
Copper Pipe, Specifications for	ASTM B 42--1952
Copper Tubes, Seamless	ASTM—B 75—1952
Copper Water Tube	ASTM B 88—1951
Fiber Insulating Boards, Structural	USDC CS 42—43 and Fed. Spec. LLL-F-321b—42
Field Inspectors Check List Building Construction	USDC BMS 81—1947
Fire Alarm Systems	NBFU 73—1954
Fire-Resistance Classification of Building Constructions	NBS BMS 92—1942
First Aid Fire Appliances	NBFU 10—1947
Gas Transmission and Distribution Piping Systems	ASA B 31.1.8—1952
Grandstands, Tents and Outdoor Assembly	ASA Z 20.3—1950
Light Gage Steel Structural Members, Specifications for Design	AISI—1946
Light Gage Steel Design Manual	AISI—1949
Lighting Handbook	IES—1952
Masonry Construction	NBS M 211 and ASA A 41.1—1953
Mechanical Refrigeration	ASA B 9.1—1953
Minimum Requirements for Small Dwelling Construction	USDC BH 18—1948
National Design Specifications Stress Grade Lumber	NLMA—1953
National Electrical Code	NBFU No. 70—1953
National Plumbing Code	USDC-DCS 28—1951
Oil Burners, Automatic Mechanical-Draft, Designed for Domestic Installation	USDC CS 75—1942
Opening Protectives	NBFU 80—1939
Plumbing Code	ASA A 40.7—1949
Plywood, Hardwood	USDC CS 35—1949
Plywood, Western Softwood	USDC CS 122—1949

Plywood, Methods of Calculating Structural Strength	USFS Oct.—1946
Plywood Technical Data	DFPA Handbook—1948
Precast Concrete Floor Units	ACI 711—1953
Prefabricated Homes	USDC CS 125—1947
Preparation and Revision of Building Codes	NBS BMS 116—1949
Pressure Piping	ASA B 31.1—1951
Safety Code for Building Construction	ASA A 10.2—1944
Safety Code for Elevators, Dumbwaiters and Moving Stairways	ASA A-17.1—1937 and A 17.3—1942
Safety Code for Manlifts	ASA A 90—1949
Safety Code for Prevention of Dust Explosions	US Dept. of Labor—Bul. 562 & 617—1947
Signs and Outdoor Display Structures	ASA A60.1—1949
Soft Solder	ASTM B 32—1949
Soldered Fittings for Copper Water Tube	ASTM A 40.3—1941
Sprinkler Equipment	NBFU 13—1947
Stack Venting of Plumbing Fixtures	NBS BHS 118—1950
Standard Ordinance Chimney Construction	NBFU—1927
Standpipe and Hose Systems	NBFU 14—1938
Steel Joist Construction, Open Web	
Short Span Series, Standard Specification	SJI—Oct. 9, 1951 and ASA A 87.1—1947
Long Span Series, Standard Specification	SJI—Apr. 28, 1953
Strength of Houses	NBS BMS 109—1948
Structural Properties Low Cost Housing	USDC BMS 2—1938
Structural Properties Prefabricated Plywood	USDC BMS 104—1945
Structural Steel for Buildings, Design, Fabrication and Erection	AISC—1949
Timber Construction Standards	AITC—1954
Unfired Pressure Vessels	ASME—1948
Uniform Plumbing Code	HHFA—1948
Wood Handbook	USFS—1947

High hazard materials handling and storage, fire protection, fire prevention and heating equipment specifications and standards	NBFU
Inspection service, test reports and approved lists of building construction, fire protection and fire extinguishing devices	ULI
Test investigations and reports of special hazards, water supplies, building construction, mill fire prevention	FML
National Fire Codes, Handbook of Fire Protection, standards and reports	NFPA
Technical Bulletins of Building Construction and Equipment	HHFA

FIRE TEST STANDARDS

Fire Hazard Classification of Building Materials	ASTM E84-1950T
Fire Retardant Properties of Textile Fabrics	ASTM D626-1941T
Fire Tests of Building Construction and Materials	ASTM E119-1953
Fire Tests of Door Assemblies	ASTM E152-1941

Note: For comprehensive list see appendixes B, C, D, E, F, G, H and I Basic Building Code.

APPENDIX C

FIRE-RESISTANCE RATINGS OF COMMON MATERIALS

General Notes

1. The thickness of construction assemblies and fire protection of elements herein specified are the minimum permissible unless approved by time-temperature performance in the Standard Fire Test for specific assemblies.

2. All assemblies shall be constructed to comply with the BOCA Basic Code in respect to details of construction and finishes.

3. Sanded gypsum plaster unless otherwise noted is mixed in the proportions of 1:2 for the scratch coat and 1:3 for the brown coat.

4. Perlite and Vermiculite plasters shall be mixed in the proportions of 100 pounds of neat gypsum to 2 cubic feet of aggregate for the scratch coat and 100 pounds of neat gypsum to 3 cubic feet of aggregate for the brown coat.

5. Total thickness of plaster is measured from face of fiber boards, wood or gypsum lath or face of masonry bases and from back of metal lath.

6. The following symbols have the meaning indicated:

F.R. — treated with approved fire-retardant process
O.S. — one side
B.S. — both sides
N.P. — not plastered
P.1.S. — plastered one side (fire side)
P.2.S. — plastered both sides (or stucco exterior)

7. Mineral wool fill includes: rock wool bats weighing 1 pound per square foot; blown-in rock wool weighing 2 pounds per square foot; glass wool weighing 0.6 pound per square foot.

8. Temporary bracing for studless partitions shall be in accordance with the approved proprietary specification for the system employed.

9. Metal lath used for studless partitions shall be installed with long dimension vertical in a continuous sheet, anchored to the floor and secured to the ceiling with runners and all joints lapped and tied.

10. Grade 1 and grade 2 concrete graded in accordance with characteristics of aggregate as specified in section 817 of the Basic Building Code.

11. When gypsum or other wall boards are applied in double layers, the first layer shall be applied vertically and the second horizontally; or both layers shall be applied horizontally with the horizontal joints staggered not less than 12 inches.

APPENDIX C-1.—MASONRY BEARING WALLS

Type of walls		Thickness in inches						
		4 hours	3 hours	2 hours	1½ hours	¾ hour or 1 hour	½ hour	⅓ hour
Solid brick and dressed stone		** 8 N.P. ***12 N.P.	** 8 N.P.	*** 8 N.P. * 4 P.2.S.	—	—	—	—
Hollow wall, solid unit		***12 N.P. ** 8 P.2.S.	***12 N.P. ** 8 P.1.S.	— ** 8 N.P.	—	—	—	—
Cavity wall (2″ air space)		***14 N.P. **10 N.P.	***14 N.P. ***10 P.2.S. **10 N.P.	***10 P.1.S. **10 N.P.	***10 N.P.	—	—	—
Hollow brick units Number of units in wall thickness	1 unit	***12 P.1.S.	***12 N.P. *** 8 P.2.S.	** 8 P.1.S. ***12 N.P.	*** 8 P.1.S.	*** 8 N.P.	—	—
	2 units	*** 8 P.2.S.	*** 8 P.1.S.	*** 8 N.P.	—	—	—	—
Hollow concrete units Grade 1	1 unit	**10 P.2.S. * 6 P.2.S.	**10 N.P. ** 8 P.1.S. * 6 P.1.S.	*** 8 P.2.S. ** 8 N.P. * 6 N.P.	*** 8 N.P.	—	—	—
	2 units	***12 N.P. *** 8 P.2.S.	***12 N.P. ** 8 N.P.	—	—	—	—	—
Hollow concrete units Grade 2		—	—	***12 P.2.S. ***10 Cav. P.2.S.	***12 P.1.S. **10 Cav. P.1.S.	***12 N.P. ***10 Cav. N.P.	*** 8 P.1.S.	*** 8 N.P.
Structural clay tile Number of Units in wall thickness	1 unit	**12 P.1.S. 3 cells	**10 P.1.S. ** 8 P.2.S. 2 cells	** 8 P.1.S. 2 cells *** 8 P.2.S.	*** 8 N.P. 2 cells	—	—	—
	2 units	***16 N.P. **12 N.P. 3 cells	**10 N.P. 3 cells ***12 N.P.	*** 8 N.P. 2 cells	—	—	—	—
Combination wall 8″ Tile and 4″ brick facing		***12 P.1.S. **12 N.P.	***12 N.P. ** 8 P.1.S.	***12 N.P. ** 8 N.P.	***12 N.P.	*** 8 N.P.	—	—
Rubble stone masonry		***16 P.1.S.	***16 N.P.	—	—	—	—	—
Mass concrete	Grade 1	** 8 N.P. ***12 N.P.	** 8 N.P. ***12 N.P.	*** 8 N.P.	*** 8 N.P.	*** 6 N.P. ** 4 N.P.	—	—
	Grade 2	**12 N.P. ** 8 P.2.S.	**10 N.P. ** 8 P.1.S.	*** 8 N.P.	—	—	—	—
Reinforced concrete	Grade 1	** 6 N.P. * 4 N.P.	—	—	—	—	—	—
	Grade 2	** 8 N.P. ** 6 P.2.S.	** 6 P.2.S.	** 6 N.P. ** 4 N.P.	—	—	—	—

*Nonbearing. **Noncombustible framing. ***Combustible framing.

APPENDIX C-2.—NON-BEARING MASONRY PARTITIONS

Type of partition	Thickness in inches						
	4 hours	3 hours	2 hours	1½ hours	¾ hour	½ hour	⅓ hour
Structural clay tile 1-cell in wall thickness	—	—	—	6 P.2.S.	6 N.P. 3 P.2.S. 4 P.1.S.	3 P.1.S.	3 N.P.
Strucutral clay tile 2-cells in wall thickness	8 P.2.S. (3 cells)	6 P.2.S. (30% solid)	6 P.2.S. —	4 P.2.S. 6 P.1.S.	4 P.1.S. 6 N.P.	4 N.P.	4 N.P.
Hollow concrete units Grade 1	6 P.2.S.	6 N.P.	6 N.P.	3 P.1.S. 4 N.P.	3 N.P.	3 N.P.	3 N.P.
Hollow concrete units Grade 2	—	—	6 P.2.S.	6 P.1.S.	4 P.2.S.	4 P.1.S.	4 N.P.
Solid gypsum blocks	5 N.P.	3 N.P.	3 N.P.	2 P.2.S.	2 N.P.*	—	—
Hollow gypsum blocks	6 N.P. 4 P.2.S.	3 P.2.S.	3 P.2.S.	3 P.1.S.	3 N.P.*	—	—
Glass blocks and wired glass	—	—	—	—	4 hollow blocks ¼ wired glass	—	—
Cinder concrete tile	6 P.2.S.	6 N.P.	4 P.2.S.	4 N.P.	3 N.P.	—	—
Reinforced concrete Grade 1	6 N.P.	4 N.P.	3 N.P.	2 N.P.	—	—	—
Reinforced concrete Grade 2	—	6 P.2.S.	6 N.P. 4 P.2.S.	4 N.P. 2 P.2.S.	2 P.1.S.	2 N.P.	—
Hollow Perlite blocks	4 N.P.	—	—	—	—	—	—

*Also approved for 1-hour rating.

Appendix C-3.—Wood Stud Walls and Partitions

Type of construction	Thickness in inches 1½ hours	1 hour	¾ hour	½ hour	⅓ hour	⅙ hour
2 x 4 studs, gypsum board	——	⅜ perforated B.S. P.2.S.	½ B.S. N.P. with *min. wool fill	½ B.S. N.P.	5/16 B.S. N.P.	5/16 O.S. N.P.
	⅜" Perf. B.S. with ½" Perlite or Vermiculite	⅜ B.S. plaster neat gypsum or Vermiculite	5/16 B.S. P.2.S.	5/16 B.S. P.2.S.	5/16 O.S. P.1.S.	
		Two ½" B.S. N.P.	Two 5/16 B.S. N.P.			——
2 x 4 studs, fiber board	——	——	——	——	——	½ B.S. N.P.
	——	⅞ B.S. F.R. P.2.S.	½ B.S. P.2.S.	⅞ O.S. F.R. P.1.S.	½ O.S. P.1.S.	½ O.S. F.R. N.P.
2 x 4 studs, metal lath	P.2.S. min. wool fill	P.2.S.-¾" 1:2 Mix	P.2.S.-¾" 1:3 Mix	——	P.2.S. with lime plaster Portland cement mortar	P.1.S.
	**P.2.S. 1" neat gypsum	P.2.S.-⅞" Portland Cement Lime Plaster 1:2 and 1:3 Mix with 3 lbs. Asbestos Fiber per Bag of Cement	P.2.S.-⅞" Portland Cement Lime Plaster 1:2 and 1:3	P.2.S.-¾" Portland Cement Lime Plaster 1:2 and 1:3		
2 x 4 studs, wood sheathing	——	——	——	¾ T.G. boards B.S. with asb. paper insul. or min. wool fill	¾ T.G. boards B.S.	——
2 x 4 studs, wood lath	——	P.2.S. min. wool fill	P.2.S. lime plaster min. wool fill	P.2.S.	P.2.S.	P.1.S.
2 x 4 studs, cement asbestos boards	——	3/16 B.S. on ⅜ gypsum boards	3/16 B.S. on 5/16 gypsum boards	3/16 B.S. min. wool fill	3/16 B.S. min. wool fill	3/16 B.S.
2 x 2 studs, plywood	——	——	¾ B.S. with min. wool fill	¾ B.S.	½ B.S.	¼ B.S.
Solid wood	——	2 F.R.	1¾ F.R.	——	2	1
Exterior Wall 2 x 4 studs	——	Outside: ½" moisture resistant gypsum sheathing and wood siding Inside: ½"—1:2 plaster on ⅜" perforated gypsum lath	——	——	——	——

All assemblies are load-bearing except where noted:
**Rated as 2-hours when non load-bearing.
*Rated as 1-hour when non load-bearing.
Sanded gypsum plaster unless otherwise noted.

APPENDIX C-4.—STEEL FRAMED WALLS AND PARTITIONS

Type of Construction	Thickness in inches						
	2½ hours	2 hours	1½ hours	1 hour	¾ hour	½ hour	⅓ hour
Solid-steel studs and metal lath		—	—	2½ portland cement mortar 2 Vermiculite	2 portland cement mortar	—	—
Solid Partition Steel Studs 16″ o.c., with metal lath	2½ neat gypsum solid	2 neat gypsum solid 2½″ Solid-perlite gypsum plaster 2½″ vermiculite gypsum	2½ sanded gypsum solid	2 sanded gypsum 1:2 solid 1½ Perlite plaster 2″ vermiculite gypsum	2 sanded gypsum solid	—	—
Solid-steel studs and gypsum lath	—	—	—	2⅜″ gypsum lath P.2.S.	—	—	—
Hollow Partition Steel Studs*** Metal lath both sides 2″ Minimum Air Space	*1″ P.2.S. neat gypsum	*1″ P.2.S. 1:1½ sanded gypsum *⅞″ P.2.S. neat gypsum	*⅞″ P.2.S. 1:½ sanded gypsum *¾″ P.2.S. neat gypsum	*1 P.2.S. portland cement mortar *¾″ P.2.S. 1:2 sanded gypsum	*¾″ P.2.S. sanded gypsum *⅞″ P.2.S. portland cement mortar	—	—
Trussed steel studs and metal lath furred 1⅛″—total thickness 4″	—	P.2.S. with 1″ Perlite plaster	—	—	—	—	—
Steel studs and steel sheathing	—	—	—	—	—	No. 18g. B.S. filled 2 lb. Vermiculite	No. 18g. B.S. filled 1½ lb. Vermiculite
Studless solid partitions	—	P.2.S.-solid 2½″ 1″ vermiculite-gypsum on ½″ gypsum lath	—	2 solid 1:2 sanded gypsum or metal lath 2-inch solid sanded gypsum, 1:1 scratch and 1:2 brown coats on ⅜ inch or ½ inch gypsum lath P.2.S.-solid 2″ ¾″ vermiculite-gypsum on ½″ gypsum lath	—	—	—
	4 hours	2 hours	1½ hours				
*Steel studs and 4″ brick veneer	¾″ sanded gypsum on metal lath O.S. 1″ wool blanket	1″ sanded gypsum on metal lath O.S. ⅞″ Vermiculite on metal lath O.S. ½″ gypsum plaster 1:2 on ½″ perf. gypsum lath	⅞″ gypsum plaster 1:2 on metal lath O.S. ¾″ neat gypsum on metal lath with wood furring strips O.S.	—	—	—	—

Unless otherwise noted, all partitions are non-load-bearing.
*Both load-bearing and non-load-bearing.
***Studs for bearing partitions to be not less than 3″ deep.

APPENDIX C-5.—TIMBER AND UNPROTECTED METAL COLUMNS

Type of construction	Thickness in inches					
	2 hours	1¼ hours	1 hour	¾ hour	½ hour	¼ hour
Heavy timber (mill)	¾″ gypsum plaster or 1″ portland cement mortar on metal lath with ¾″ air space	reinforced concrete or protected steel caps	—	unprotected caps	—	—
Concrete filled pipe (4000 lb. concrete)	—	—	interior reinforcement	6⅝″ H.W. or over	Less than 6⅝″ H.W.	—
Unprotected structural steel	—	—	—	—	—	min. dimen. 6″
Unprotected cast iron	—	—	—	concrete filled	min. th. metal ¾″	—

APPENDIX C-6.—STRUCTURAL STEEL COLUMN PROTECTION

Type of protection		Thickness in inches					
	4 hours	3 hours	2 hours	1½ hours	1 hour	¾ hour	½ hour
Poured concrete Grade 1	2	2	2	1½	——	1	——
Poured concrete Grade 2	4	3	3	2	——	1½	——
Concrete F. P. units	4 P.1.S.	4 P.1.S.	3 P.1.S.	2 P.1.S.	——	2 N.P.	1½ N.P.
Clay tile F.P. units	4 P.1.S.	3 P.1.S.	3 P.1.S.	2 P.1.S.	——	——	——
Gypsum tile F.P. units	4 hollow or 3 P.1.S. 2 solid P.1.S.	3 hollow 2 solid P.1.S.	3 hollow 2 solid	——	——	——	——
Brick units	4	4	4	2	——		——
Poured gypsum	2 reinf.	2 reinf.	2 reinf	1½ reinf.	——	¾	——
Gypsum plaster on metal lath	——	Two ¾" layers ¾" air space	Two ¾" layers ¾" air space	1½" Double reinf.	¾"-1:3*	¾" (1-hr)	——
Portland cement plaster on metal lath	——	Two 1" layers ¾" air space	Two ¾" layers ¾" air space	1¾" Double reinf.	1"-1-2½*	⅞" 1" (1-hr)	¾"
Vermiculite or Perlite plaster on metal lath	Metal lath furred 1" and 1" plaster hollow spaces filled loose Vermiculite 2¾" reinf. plaster on flanges and 1½" plaster on metal lath unfilled other faces	1" on metal lath furred hollow space filled (2" on flanges) and 1¼" on metal lath unfilled other faces	¾" on metal lath furred hollow spaces filled (1¾" on flanges) and 1" on metal lath unfilled other faces	⅝" on metal lath furred hollow spaces filled (1⅝" on flanges) and ⅞" on metal lath unfilled other faces	—— ——	½" on metal lath furred hollow spaces filled (1½" on flanges) and ¾" on metal lath unfilled other faces	—— ——
Vermiculite or perlite plaster on gypsum lath	1½" vermiculite gypsum applied over 2 layers of ½" plain long-length gypsum lath wrapped with one layer of poultry netting	1" vermiculite gypsum applied over 2 layers of ½" plain long-length gypsum lath wrapped with one layer of poultry netting	1" vermiculite gypsum applied over 1 layer of ⅜ perforated gypsum lath. No poultry netting	——	——	——	——
Vermiculite or perlite on metal lath furred out 1¼" from column flanges. No loose fill	1½" plaster on lath with space behind lath filled with plaster on flanges	1" plaster on lath with space behind lath filled with plaster on flanges	1" plaster on lath without plaster backfill	⅞" plaster on lath without plaster backfill	——	¾" plaster on lath without plaster backfill	——
Vermiculite plaster on self-furring metal lath	1¾"	——	——	——	——	——	——
Perlite gypsum on self-furring metal lath*	1¾"	1⅜"	1"	——	¾"	——	——
Perlite-gypsum on metal lath furred out 7/16" from column with ¾" brackets 24" vertical intervals*	1½"	——	——	——	——	——	——

*No backfill required.

APPENDIX C-7.—STEEL TRUSS AND GIRDER PROTECTION

Type of protection	Thickness in inches					
	4 hours	3 hours	2 hours	1½ hours	¾ hour	½ hour
Poured concrete { Grade 1 Grade 2	3 2½	2 2½	2 2½	1½ 2	1 1½	½ 1½
Concrete F.P. units	3 2 P.1.S.	3 2 P.1.S.	3 2 P.1.S.	2 —	2 —	2 —
Clay tile F.P. units	4 3 P.1.S.	3 2 P.1.S.	3 2 P.1.S.	2 —	2 —	2 —
Gypsum tile F.P. units	2 solid P.1.S. 3 hollow P.1.S.	2 solid P.1.S. 3 hollow P.1.S.	2 solid 3 hollow	— —	— —	— —
Brick units	4	4	2¼	2	—	—
Poured gypsum	2	2	1½	1	—	—
Gypsum plaster on metal lath	—	—	1	¾	—	—
Portland cement plaster on metal lath	—	—	1"-1:2 scratch 1:2½ brown 10 lbs. lime and 3 lbs. asbestos fiber per bag of cement	¾"-1:2 scratch 1:3 brown 15 lbs. lima and 3 lbs. asbestos fiber per bag of cement	—	—
Vermiculite or perlite plaster on metal lath	1" plaster. Ceiling, ½" vermiculite accoustical plastic over ⅝" vermiculite plaster	⅞" plaster. Ceiling with air ducts, pipes and electrical outlets, aggregate areas not to exceed 100 sq. in. in any 100 sq. ft. ceiling area, ⅞" vermiculite plaster	¾	¾	¾	—

Note: Floor beams and other secondary members protected in accordance with required fire-resistance rating of the floor construction

APPENDIX C-8.—FLOOR AND ROOF ASSEMBLIES

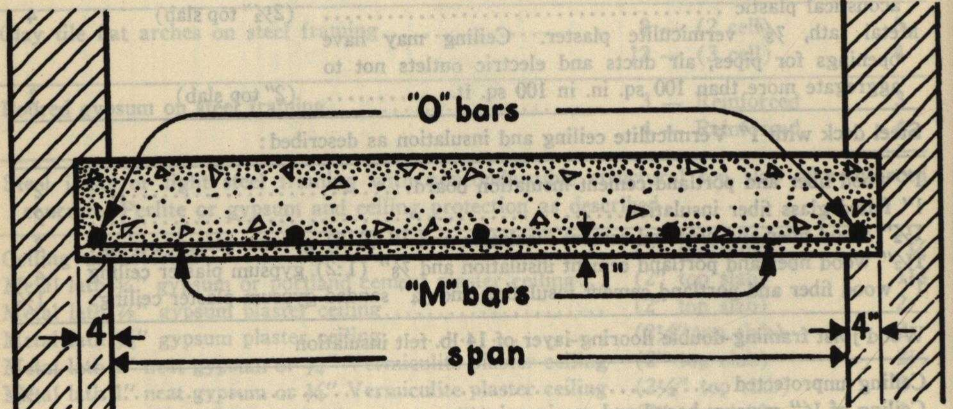
Type of construction	*Over-all thickness inches*	*Fire-resistance rating hours*
Brick unit segmental arches on steel framing.............	4 with concrete spandrel fill 8 with concrete spandrel fill	3
Clay tile segmental arches on steel framing...............	6 with concrete spandrel fill (2 cell) 8 with concrete spandrel fill (2 cell)	3 4
Clay tile flat arches on steel framing....................	8 — (2 cell) 12 — (3 cell)	3 4
Poured gypsum on steel framing..........................	3 — Reinforced 4 — Reinforced	3 4
Steel joists or light steel framing with noncombustible structural top slab of reinforced concrete, Perlite or gypsum and ceiling protection as described		
Ceiling unprotected	(2″ top slab)	¼
Metal lath ¾″ gypsum or portland cement plaster ceiling...	(2″ top slab)	1½
Metal lath ⅞″ gypsum plaster ceiling....................	(2″ top slab)	2
Metal lath ¾″ gypsum plaster ceiling....................	(2¼″ top slab)	2
Metal lath 1″ neat gypsum or ¾″ Vermiculite plaster ceiling	(2″ top slab)	2½
Metal lath 1″ neat gypsum or ¾″ Vermiculite plaster ceiling	(2½″ top slab)	3
Precast or poured reinforced 1½″ gypsum ceiling..........	(2″ top slab)	3
Precast 2″ gypsum tile with ½″ plaster ceiling...........	(2″ top slab)	4
Poured 1½″ reinforced portland cement ceiling...........	(2″ top slab)	4
Metal lath 1″ Vermiculite plaster ceiling.................	(2½″ top slab)	4
Metal lath 1″ Perlite plaster ceiling, furred 3″............	(2″ Perlite top slab)	4
Steel joists on light steel framing with wood flooring		
Double floor of wood or wood and fiber board applied to steel deck Metal lath ¾″ gypsum or 1″ portland cement plaster ceiling		1
Flooring 1″ T&G on 2x2 wood strips bolted to joists Metal lath ¾″ gypsum or 1″ portland cement plaster ceiling		¾
Flooring 1-inch T & G on nailers applied to steel deck with insulating paper cemented thereto and metal lath ceiling with ¾-inch sanded gypsum or 1-inch Portland cement plaster		1
Structural steel framing with steel deck and portland cement concrete floors and ceiling protection as described		
Metal lath ¾″ gypsum plaster ceiling....................	(1½″ top floor slab)	1½
Metal lath ¾″ gypsum or 1″ portland cement plaster ceiling	(2″ top floor slab)	2
Metal lath 1″ gypsum plaster ceiling....................	(2½″ top floor slab)	2½
Metal lath 1″ neat gypsum or ¾″ Vermiculite ceiling......	(2½″ top floor slab)	3
Metal lath 1″ Vermiculite plaster ceiling.................	(2½″ top floor slab)	4

Type of construction	*Over-all thickness inches*	*Fire-resistance rating hours*
Structural steel framing with formed long span steel floor deck and Portland cement, perlite or vermiculite concrete floors and ceiling protection as described		
Metal lath and furring 1″ neat gypsum and 2″ air space	(2″ top floor slab)	3
Metal lath and furring 1″ neat gypsum and 9″ air space	(2″ top floor slab)	4
Metal lath and furring 1″ Vermiculite plaster and 2″ air space	(2″ top floor slab)	4
Metal lath and furring ⅞″ Vermiculite plaster and 2½″ air space	(2″ top floor slab)	4
Metal lath and furring 1″ Vermiculite plaster	(2″ Vermiculite top slab)	4
Metal lath, ⅝″ vermiculite plaster plus ½″ vermiculite acoustical plastic	(2½″ top slab)	4
Metal lath, ⅞″ vermiculite plaster. Ceiling may have openings for pipes, air ducts and electric outlets not to aggregate more than 100 sq. in. in 100 sq. ft.	(2″ top slab)	3
Steel deck with 1″ Vermiculite ceiling and insulation as described:		
1″ wood fiber and portland cement insulation board		2
1″ felted glass fiber insulation		2
1½″ wood fiber and portland cement insulation and 1″ (1:2) gypsum plaster ceiling.		2
1½″ wood fiber and portland cement insulation and ⅞″ (1:2) gypsum plaster ceiling		2
1″ wood fiber and portland cement insulation and ¾″ sanded gypsum plaster ceiling.		1½
Wood joist framing-double flooring-layer of 14 lb. felt insulation		
Ceiling unprotected		¼
Ceiling of ½″ gypsum board and casein paint		⅓
Ceiling of ⅜″ gypsum board and asbestos paper		⅓
Ceiling of ⅜″ gypsum board and ½″ gypsum plaster		½
Ceiling of ½″ gypsum board and asbestos paper		½
Ceiling of ½″ f.r. fiber board and ½″ gypsum plaster		½
Ceiling of two ⅜″ gypsum boards		½
Ceiling of two ⅜″ gypsum boards and ½″ gypsum plaster		¾
Ceiling of ⅜″ perforated gypsum board and ½″ gypsum plaster 3″ metal lath strips over joints		1
Ceiling metal lath and ⅝″ Vermiculite plaster		1
Ceiling metal lath and ¾″ gypsum plaster		1
Ceiling metal lath and ⅞″ portland cement plaster		1
Ceiling metal lath ¾″ portland cement and asbestos fiber plaster		1
Ceiling of ⅜″ gypsum lath and ½″ perlite or vermiculite plaster with chicken wire reinforcing		1¾
Ceiling of two ½-inch gypsum boards with 20-gauge galvanized wire mesh		1
Ceiling of ⅜-inch perforated gypsum lath with ½-inch perlite or vermiculite plaster		1
Ceiling of ¾″ perlite or vermiculite plaster on metal lath		1½

APPENDIX D-1.—ONE- AND TWO-WAY CONCRETE SLABS

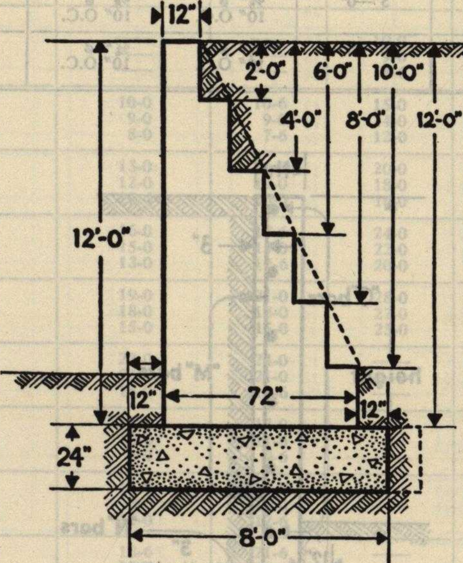
Live load 40 pounds per square foot

Span in feet	Depth in inches	One-way slabs		Two-way slabs	
		"M" bars	"O" bars	"M" bars	"O" bars
6	4	⅜″ø—10″ O.C.	¼″ø— 6″ O.C.	⅜″ø—12″ O.C.	⅜″ø—12″ O.C.
8	4	⅜″ø— 8″ O.C.	¼″ø— 6″ O.C.	⅜″ø—10″ O.C.	⅜″ø—10″ O.C.
10	6	⅜″ø— 6″ O.C.	⅜″ø—12″ O.C.	½″ø—15″ O.C.	½″ø—15″ O.C.
12	6	½″ø— 8″ O.C.	⅜″ø—12″ O.C.	½″ø—10″ O.C.	½″ø—10″ O.C.
14	8	⅝″ø—10″ O.C.	⅜″ø— 8″ O.C.	½″ø—12″ O.C.	½″ø—12″ O.C.
16	8	⅝″ø— 8″ O.C.	⅜″ø— 8″ O.C.	⅝″ø—12″ O.C.	⅝″ø—12″ O.C.



APPENDIX D-2.—SOLID MASONRY RETAINING WALLS

Height in feet	Top thickness in inches	Bottom thickness in inches	Base width in feet	Base thickness in inches
6	12	36	5′—0″	13
8	12	48	6′—0″	16
10	12	60	7′—0″	20
12	12	72	8′—0″	24



APPENDIX D-3.—CANTILEVER RETAINING WALLS

Height in feet	Thickness in inches	Base "A" in feet	Reinforcing bars			
			"M"	"N"	"O"	"P"
6	10	3′—0″	⅜″ ø 12″ O.C.	⅜″ ø 12″ O.C.	⅜″ ø 12″ O.C.	⅜″ ø 12″ O.C.
8	12	4′—0″	½″ ø 12″ O.C.	½″ ø 12″ O.C.	⅜″ ø 12″ O.C.	⅜″ ø 12″ O.C.
10	14	5′—0″	⅝″ ø 10″ O.C.	⅝″ ø 10″ O.C.	⅜″ ø 12″ O.C.	⅜″ ø 12″ O.C.
12	16	6′—0″	¾″ ø 10″ O.C.	¾″ ø 10″ O.C.	⅜″ ø 12″ O.C.	⅜″ ø 12″ O.C.

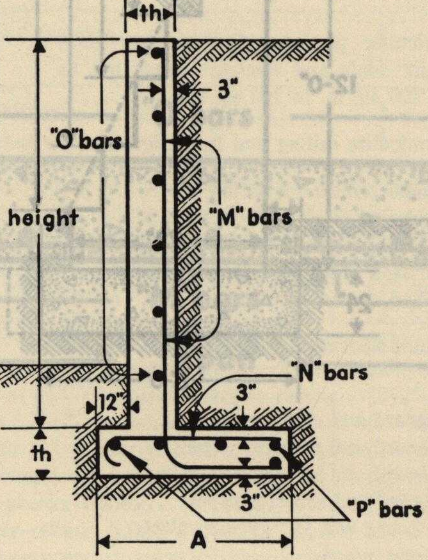


TABLE 8.—MAXIMUM CLEAR SPANS IN FEET OF JOISTS, BEAMS AND RAFTERS

40-pound live load; 30-pound roof load

Size Inches	Spacing Inches	Floors 40-pound live load Plastered ceilings	Floors and habitable Attics 30-pound live load Plastered ceilings	Floors No plastered ceilings	Ceiling Joists Plastered	Uninhabitable Attics 20-pound live load Plastered	Roofs
2 x 4	12	—	—	—	10-0	7-0	8-0
	16	—	—	—	9-0	6-6	7-0
	24	—	—	—	8-6	5-6	5-9
2 x 6	12	9-0	10-0	10-6	15-0	12-0	12-6
	16	8-6	9-0	9-0	14-0	10-0	10-9
	24	7-0	8-0	7-6	12-0	8-6	9-0
2 x 8	12	12-0	13-0	14-0	20-0	14-6	16-0
	16	11-4	12-0	12-0	18-0	13-0	14-0
	24	9-6	10-6	10-0	16-0	11-6	12-0
2 x 10	12	15-0	16-0	17-6	24-0	18-0	20-0
	16	14-0	15-0	15-0	22-0	16-6	18-0
	24	12-0	13-0	12-6	20-0	14-6	15-0
2 x 12	12	18-6	19-0	21-0	28-0	21-6	24-0
	16	16-6	18-0	18-0	27-0	20-0	21-0
	24	14-6	15-0	15-0	25-0	17-6	18-0
2 x 14	12	21-6	23-0	24-0	—	25-0	28-0
	16	19-6	21-0	21-0	—	23-0	25-0
	24	17-0	18-0	17-6	—	20-6	20-0
3 x 6	12	10-0	11-6	13-0	—	12-6	15-0
	16	9-6	10-6	11-6	—	11-6	13-6
	24	8-6	9-0	9-6	—	10-0	11-0
3 x 8	12	14-0	15-0	17-0	—	16-6	20-0
	16	12-6	13-6	15-0	—	15-0	17-6
	24	11-0	12-0	12-6	—	13-6	14-6
3 x 10	12	17-6	18-6	21-6	—	26-0	25-0
	16	16-0	17-0	19-0	—	19-0	22-0
	24	14-0	15-0	15-6	—	17-0	18-6
3 x 12	12	21-0	22-6	26-0	—	23-0	27-0
	16	19-6	20-6	22-6	—	21-6	23-6
	24	17-0	18-6	19-0	—	19-0	20-0
3 x 14	12	24-6	26-0	28-0	—	25-0	28-0
	16	22-6	24-0	26-0	—	23-0	27-6
	24	20-0	21-6	22-0	—	21-6	23-0

TABLE 9.—MAXIMUM SPANS IN FEET OF FLOOR JOISTS

Live load 60 pounds per square foot

Size in inches	Spacing in inches	Plastered ceiling	No plastered ceiling
2 x 6	12	8-0	9-0
	16	7-6	8-0
	24	6-6	6-6
2 x 8	12	10-6	12-0
	16	9-6	10-6
	24	8-0	8-6
2 x 10	12	13-6	15-0
	16	12-6	13-0
	24	11-0	11-0
2 x 12	12	16-6	18-0
	16	15-0	16-0
	24	13-0	13-0
2 x 14	12	19-0	21-0
	16	17-6	18-6
	24	15-6	15-6
3 x 6	12	9-6	11-6
	16	8-6	10-0
	24	7-6	8-0
3 x 8	12	12-6	15-0
	16	11-6	13-0
	24	10-0	10-6
3 x 10	12	15-6	19-0
	16	14-6	16-6
	24	12-6	13-6
3 x 12	12	19-0	22-6
	16	17-6	19-6
	24	15-0	16-6
3 x 14	12	22-0	25-6
	16	20-0	22-6
	24	18-0	19-6

TABLE 10.—MAXIMUM SPANS IN FEET OF FLOOR JOISTS
Live load 100 pounds per square foot

Size in inches	Spacing in inches	Plastered ceiling	No plastered ceiling
2 x 8	12	9-0	9-6
	16	8-6	8-6
	24	—	—
2 x 10	12	11-6	12-0
	16	10-6	10-6
	24	8-6	8-6
2 x 12	12	14-0	14-6
	16	13-0	13-0
	24	11-0	10-6
2 x 14	12	16-6	17-0
	16	15-0	15-0
	24	12-6	12-6
3 x 6	12	8-0	9-0
	16	7-6	8-0
	24	6-6	6-6
3 x 8	12	10-6	12-0
	16	9-6	10-6
	24	8-6	8-6
3 x 10	12	13-6	15-6
	16	12-6	13-6
	24	11-0	11-0
3 x 12	12	16-6	18-6
	16	15-0	16-0
	24	13-0	13-6
3 x 14	12	19-0	21-6
	16	17-6	19-0
	24	15-6	15-6

TABLE 11.—MAXIMUM SPANS IN FEET OF FLOOR JOISTS
Live load 120 pounds per square foot

Size inches	Spacing inches	Plastered ceiling	No plastered ceiling
2 x 8	12	8-6	9-0
	16	8-0	7-6
	24	6-0	6-0
2 x 10	12	11-0	11-0
	16	9-6	9-6
	24	7-6	7-6
2 x 12	12	13-0	13-6
	16	11-6	11-6
	24	10-6	10-6
2 x 14	12	15-6	15-6
	16	14-0	13-6
	24	12-0	11-0
3 x 6	12	7-6	8-6
	16	7-0	7-6
	24	6-0	6-0
3 x 8	12	10-0	11-0
	16	9-0	9-6
	24	8-0	8-0
3 x 10	12	12-6	14-0
	16	11-6	12-0
	24	10-0	10-0
3 x 12	12	15-0	17-0
	16	14-0	14-0
	24	12-0	12-0
3 x 14	12	18-0	19-6
	16	16-0	17-0
	24	14-0	14-0

APPENDIX D-5.—SAFE LOADS

TABLE 12.—SAFE LOADS FOR STRUTS, POSTS AND COLUMNS

Thousands of pounds, concentric load

Size of member		Unsupported height in feet													
Size in inches	Area in square inches	2	4	6	8	10	12	14	16	18	20	25	30	35	40	50
2 x 4	5.89	5.0	3.5	1.75	1.0	—	—	—	—	—	—	—	—	—	—	—
2 x 6	9.14	8.0	5.5	2.75	1.5	—	—	—	—	—	—	—	—	—	—	—
4 x 4	13.14	10.0	11.5	10.5	8.0	5.0	4.0	3.0	2.0	—	—	—	—	—	—	—
4 x 6	20.39	19.0	18.0	16.0	12.0	8.0	6.0	5.0	3.0	—	—	—	—	—	—	—
6 x 6	30.25	—	28.0	26.5	25.0	24.0	18.0	14.0	11.0	9.0	7.5	4.5	—	—	—	—
6 x 8	41.25	—	38.0	36.0	34.0	33.0	25.0	21.0	16.5	12.0	10.0	6.0	—	—	—	—
8 x 8	56.25	—	—	50.0	49.0	48.0	46.0	44.0	39.0	34.0	22.5	16.0	11.0	8.0	—	—
8 x 10	71.25	—	—	64.0	62.5	60.0	58.0	56.0	49.0	42.0	28.5	19.0	13.0	10.0	—	—
10 x 10	90.25	—	—	—	82.0	78.5	77.0	75.0	72.0	64.0	55.0	40.5	26.0	20.0	15.0	—
10 x 12	109.25	—	—	—	99.0	96.0	93.0	89.0	87.0	85.0	68.0	43.5	32.0	25.0	18.0	—
12 x 12	132.25	—	—	—	—	118.0	112.0	111.0	110.0	108.0	105.0	80.0	53.0	40.0	33.0	20.0

TABLE 13.—SAFE LOADS FOR FRAME BEARING WALLS AND PARTITIONS WITH SHEATHING OR PLASTERING ON BOTH SIDES

Thousands of pounds—per foot—concentric load

Size of studs in inches	Spacing in inches	Unsupported Height in Feet												
		7	8	9	10	11	12	14	16	18	20	25	30	35
2 x 2	16	0.5	0.3											
	24	0.3	0.2											
	36	0.2	0.1											
	48	0.15	0.05											
2 x 3	16	1.6	1.3	0.9	0.8	0.6	0.5							
	24	1.1	0.8	0.6	0.5	0.4	0.3							
	36	0.7	0.6	0.5	0.4	0.3	0.2							
	48	0.6	0.5	0.4	0.3	0.2	0.1							
2 x 4	16	3.8	2.6	2.2	1.8	1.5	1.3	1.1	0.7					
	24	2.5	1.8	1.5	1.2	1.0	0.8	0.7	0.4					
	36	1.7	1.2	1.0	0.8	0.7	0.6	0.5	0.3					
	48	1.3	0.9	0.7	0.6	0.5	0.4	0.3	0.2					
3 x 4	16	6.0	4.0	3.5	3.0	2.5	2.0	1.5	1.0					
	24	4.0	3.0	2.5	2.0	1.7	1.5	1.2	0.7					
	36	2.7	1.9	1.6	1.3	1.1	1.0	0.8	0.5					
	48	2.0	1.4	1.2	0.9	0.8	0.7	0.6	0.4					
2 x 6	16	6.0	5.8	5.6	5.5	4.8	4.0	3.4	2.7	2.0	1.7	1.0		
	24	4.0	3.9	3.8	3.7	3.2	2.7	2.3	1.8	1.4	1.1	0.7		
	36	2.6	2.5	2.4	2.3	2.1	1.8	1.5	1.2	0.9	0.8	0.5		
	48	2.0	1.9	1.8	1.7	1.6	1.4	1.1	0.9	0.7	0.6	0.3		
3 x 6	16	9.5	9.4	9.2	8.9	7.7	6.6	5.5	4.4	3.3	2.2	1.7		
	24	6.3	6.1	6.0	5.9	5.2	4.4	3.7	2.9	2.2	1.8	1.1		
	36	4.2	4.1	4.0	3.9	3.4	2.9	2.5	2.0	1.5	1.2	0.7		
	48	3.1	3.0	2.9	2.8	2.6	2.2	1.8	1.5	1.1	0.9	0.6		
4 x 6	16	13.0	12.8	12.6	12.2	10.7	9.1	7.6	6.1	4.6	3.8	2.3		
	24	8.7	8.6	8.4	8.1	7.1	6.0	5.0	4.0	3.0	2.5	1.5		
	36	5.8	5.7	5.6	5.4	4.8	4.1	3.4	2.7	2.0	1.7	1.0		
	48	4.3	4.2	4.1	4.0	3.5	3.0	2.5	2.0	1.5	1.3	0.8		
2 x 8	16	8.2	8.1	8.0	7.8	7.6	7.5	7.3	5.5	4.5	3.5	2.5	1.8	1.4
	24	5.5	5.4	5.3	5.2	5.1	5.0	4.9	3.5	3.0	2.5	1.7	1.2	0.9
	36	3.7	3.6	3.5	3.4	3.3	3.2	3.1	2.5	2.0	1.5	1.2	0.8	0.6
	48	2.7	2.7	2.6	2.6	2.5	2.5	2.4	1.8	1.5	1.2	0.8	0.6	0.5
3 x 8	16	13.3	13.0	12.9	12.7	12.5	12.0	11.8	9.0	7.5	6.0	4.0	3.0	2.0
	24	8.9	8.7	8.6	8.4	8.3	8.1	7.9	5.9	4.9	3.9	2.8	2.0	1.5
	36	5.9	5.8	5.7	5.6	5.5	5.4	5.2	3.9	3.3	2.6	1.8	1.3	1.0
	48	4.4	4.3	4.3	4.2	4.2	4.1	3.9	2.9	2.5	2.0	1.4	1.0	0.7

Table 5.—Fire-Resistance Ratings of Structural Elements in Hours

	STRUCTURAL ELEMENT			TYPE OF CONSTRUCTION									
				TYPE 1		TYPE 2			TYPE 3			TYPE 4	
						NONCOMBUSTIBLE		Note b	EXTERIOR MASONRY WALLS			FRAME	
				FIREPROOF		PROTECTED		UNPROTECTED	HEAVY TIMBER (MILL)	ORDINARY		PROTECTED	UNPROTECTED
										PROTECTED	UNPROTECTED		
				1A	1B	2A	2B	2C	3A	3B	3C	4A	4B
1	EXTERIOR WALLS Note a	ON STREET LOT LINES OR WITH FIRE SEPARATION OF 30' OR MORE FROM INTERIOR LOT LINES OR ANY BUILDING	BEARING	4	3	2	3/4	0	2	2	2	1/2	0
			NON-BEARING	3/4	3/4	3/4	3/4	0	3/4	3/4	3/4	1/2	0
		ON INTERIOR LOT LINES OR LESS THAN 6' THEREFROM OR FROM ANY BUILDING	BEARING	4	3	2	1-1/2	3/4 Note c	2	2	2	3/4	3/4
			NON-BEARING	2	2	1-1/2	3/4	3/4 Note c	2	2	2	3/4	3/4
		6' OR MORE BUT LESS THAN 11'	BEARING	4	3	2	3/4	0	2	2	2	1/2	0
			NON-BEARING	2	2	1-1/2	3/4	0	2	2	2	1/2	0
		11' OR MORE BUT LESS THAN 30'	BEARING	4	3	2	3/4	0	2	2	2	1/2	0
			NON-BEARING	1-1/2	1-1/2	3/4	3/4	0	1-1/2	1-1/2	1-1/2	1/2	0
2	INTERIOR BEARING WALLS AND PARTITIONS			4	3	2	3/4	0	2	3/4	0	1/2	0
				IN NO CASE LESS THAN FIRE GRADING OF USE GROUP-(See Table 16)									
3	FIRE WALLS			4	3	2	2	2	2	2	2	2	2
				IN NO CASE LESS THAN FIRE GRADING OF USE GROUP -(See Table 16)									
4	FIRE DIVISIONS			FIRERESISTANCE RATING CORRESPONDING TO FIRE GRADING OF USE GROUP - (See Table 16)									
5	FIRE ENCLOSURE OF EXITWAYS, ELEVATOR HOISTWAYS, PUBLIC HALLWAYS AND STAIRWAYS Note e			2	2	2	2	2	2	2	2	3/4	Note d 3/4
				NONCOMBUSTIBLE									
6	SHAFTS OTHER THAN STAIRWAYS			2	2	2	2	2	2	2	2	3/4	3/4
				NONCOMBUSTIBLE									
7	CORRIDOR PARTITIONS & VERTICAL SEPARATION OF TENANT SPACES			3/4	3/4	3/4	3/4	0	3/4	3/4	0	1/2	0
				NONCOMBUSTIBLE									
	OTHER NON-BEARING PARTITIONS (See Art. 9)								0	0	0	0	0
				NONCOMBUSTIBLE									
8	COLUMNS, GIRDERS, TRUSSES, (OTHER THAN ROOF TRUSSES) AND FRAMING	SUPPORTING ONE FLOOR		3	2	1-1/2	3/4	0	3/4	3/4	0	1/2	0
		SUPPORTING MORE THAN ONE FLOOR		4	3	2	3/4	0	3/4	3/4	0	1/2	0
9	STRUCTURAL MEMBERS SUPPORTING WALL			REQUIRED FIRERESISTANCE OF WALL SUPPORTED BUT NOT LESS THAN FIRERESISTANCE RATING FOR TYPE OF CONSTRUCTION									
10	FLOOR CONSTRUCTION INCLUDING BEAMS			3	2	1-1/2	3/4	0	See Sec. 217	3/4	0	1/2	0
11	ROOF CONSTRUCTION INCLUDING BEAMS - 15' OR LESS IN HEIGHT			2	1-1/2	3/4	3/4	0	See Sec. 217	3/4	0	1/2	0
12	ROOF TRUSSES AND FRAMING INCLUDING ARCHES AND ROOF DECK Note f	MORE THAN 15' BUT LESS THAN 20' IN HEIGHT TO LOWEST MEMBER		3/4	3/4	3/4	0	0	See Sec. 217	0	0	1/2	0
		20' OR MORE IN HEIGHT TO LOWEST MEMBER		0	0	0	0	0	See Sec. 217	0	0	0	0

Note a.—The fire separation or fire exposure in feet as herein limited applies to the distance from other buildings on the site, or from an interior lot line or from the opposite side of a street or other public space not less than thirty (30) feet wide to the building wall. (See *Definitions,* section 901.)

Note b.—Protected exteriors shall be required within the fire limits in type 2 construction as follows: high hazard uses, 2-hour fire resistance with fire separation up to 11 feet.

Note c.—One-story buildings of type 2-C construction which do not exceed three thousand (3000) square feet in area in all use groups except high hazard, assembly and institutional shall be exempt from the protected exterior wall requirements of table 5. (See section 302.4.)

Note d.—Party walls in type 4 buildings shall be as follows: 1- and 2-family dwellings, ¾-hour fire resistance. (See section 907.3.) Other uses 2 hours, but not less than the fire grading of the use group. (See table 16.)

Note e.—Stair enclosures in all buildings, other than 1- and 2-family dwellings, which do not exceed three (3) stories or forty (40) feet in height with an occupancy load of less than forty (40) below and less than seventy-five (75) above the grade floor shall be of not less than ¾-hour fire resistance. In buildings of types 3 and 4 construction, such ¾-hour enclosures may be of combustible construction as provided in section 618.93.

Note f.—In all buildings in which the roof framing may be unprotected, roof slabs and decking may be noncombustible without fire-resistance rating except that in buildings not more than five (5) stories in height, roof decking may be of mill type construction or of any other materials providing equivalent fire-resistant and structural properties. (See sections 217 and 915.)

Note g.—The fire-resistance rating of exterior load-bearing enclosure walls and of all fire division walls against interior fire exposure shall be not less than the fire grading of the use group; and all exterior non-bearing enclosure walls shall provide the fire-resistance specified in Item 1 of Table 5 against exterior exposure and shall be constructed to maintain their place in the structure under interior fire exposure equivalent to the fire grading of the use group. (See table 16.)

Note h.—For special high hazard uses involving a higher degree of fire severity and higher concentration of combustible contents, the fire-resistance requirements for structural elements shall be increased accordingly. (See section 400.)

Table 6.—General Height and Area Limitations of One-Story Buildings Facing on One Street or Public Space Not Less Than 30 Feet Wide

Notes a, d and 1

Areas in square feet; heights in number of stories and feet

N.P. - NOT PERMITTED

☒ UNLIMITED

	USE GROUP		TYPE OF CONSTRUCTION									
			TYPE 1		TYPE 2			TYPE 3			TYPE 4	
			FIREPROOF		NONCOMBUSTIBLE			EXTERIOR MASONRY WALLS			FRAME	
					PROTECTED		UNPROTECTED	(H.T.) MILL	ORDINARY (JOISTED)		PROTECTED	UNPROTECTED
									PROTECTED	UNPROTECTED		
			1A	1B	2A	2B	2C	3A	3B	3C	4A	4B
A	HIGH HAZARD	Notes h. and m.	5St.65' 14 000	3St.40' 11 000	3St.40' 7 000	2St.30' 6 000	1St.20' 3 500	2St.30' 6 000	2St.30' 5 000	1St.20' 3 500	1St.20' 3 000	N.P.
B-1	STORAGE - MODERATE	Notes b,d,e,f,i, and j.	☒	5St.65' 20 000	5St.65' 12 000	4St.50' 9 500	2St.30' 6.500	4St.50' 9 500	3St.40' 8 750	2St.30' 6 500	2St.30' 5 000	1St.20' 3 500
B-2	STORAGE - LOW	Notes b, d, e, and f.	☒	☒	7St.85' 21 000	5St.65' 16 500	3St.40' 11 000	5St.65' 16 500	4St.50' 15 000	3St.40' 11 000	3St.40' 9 000	2St.30' 6 000
C	MERCANTILE	Notes b, d, e, and f	☒	12St.135' 22 000	6St.75' 14 000	4St.50' 11 000	2St.30' 7 500	4St.50' 11 000	3St.40' 10 000	2St.30' 7 500	2St.30' 6 000	1St 20' 4 000
D	INDUSTRIAL	Notes b,d,e, and f.	☒	12St.135' 22 000	6St.75' 14 000	4St.50' 11 000	2St.30' 7 500	4St.50' 11 000	3St.40' 10 000	2St.30' 7 500	2St.30' 6 000	1St.20' 4 000
E	BUSINESS	Notes b,d,e, and f.	☒	☒	7St.85' 21 000	5St.65' 16 500	3St.40' 11 000	5St.65' 16 500	4St.50' 15 000	3St.40' 11 000	3St.40' 9 000	2St.30' 6 000
F-1-A	ASSEMBLY THEATRES	With stage and scenery	☒	6St.75' 11 000	4St.50' 7 000	2St.30' 6 000	1St.20' 4 000	2St.30' 6 000	2St.30' 5 000	1St.20' 4 000	1St.20' 3 000	N.P.
F-1-B		Without stage (Motion Picture Theatres)	☒	9St.100' 20 000	5St.65' 12 000	3St.40' 10 000	2St.30' 6 500	3St.40' 10 000	3St.40' 8 750	2St.30' 6 500	1St.20' 5 000	1St.20' 3 500
F-2	ASSEMBLY - NIGHT CLUBS AND SIMILAR USES		☒	4St.50' 6 000	3St.40' 4 000	2St.30' 3 000	1St.20' 2 000	2St.30' 3 000	2St.30' 2 500	1St.20' 2 000	1St.20' 1 500	1St.20' 1 000
F-3	ASSEMBLY -	LECTURE HALLS-RECREATION CENTERS-TERMINALS RESTAURANTS OTHER THAN NIGHT CLUBS Note e	☒	9St.100' 20 000	5St.65' 12 000	3St.40' 10 000	2St.30' 6 500	3St.40' 10 000	3St.40' 8 750	2St.30' 6 500	1St.20' 5 000	1St.20' 3 500
F-4	ASSEMBLY -	CHURCHES SCHOOLS	☒	9St.100' 22 000	5St.65' 14 000	3St.40' 11 000	2St.30' 7 500	3St.40' 11 000 Note g	3St.40' 10 000	2St.30' 7 500	1St.20' 6 000 Note g	1St.20' 4 000 Note g
H-1	INSTITUTIONAL - RESTRAINED		☒	6St.75' 14 000	4St.50' 9 000	2St.30' 7 500	1St.20' 5 000	2St.30' 7 500	2St.30' 6 000	1St.20' 5 000	1St.20' 3 500	N.P.
H-2	INSTITUTIONAL - INCAPACITATED		☒	8St.90' 17 000	4St.50' 10 000	2St.30' 8 000	1St.20' 6 000	2St.30' 8 000	2St.30' 7 500	1St.20' 6 000	1St.20' 4 000	N.P.
L-1	RESIDENTIAL - HOTELS		☒	☒	9St.100' 14 000	4St.50' 11 000	3St.40' 7 500	4St.50' 11 000	4St.50' 10 000	3St.40' 7 500	3St.40' 6 000	2½St.35' 4 000
L-2	RESIDENTIAL - MULTI-FAMILY		☒	☒	9St.100' 14 000	4St.50' 11 000 Note K	3St.40' 7 500	4St.50' 11 000	4St.50' 10 000 Note K	3St.40' 7 500	3St.40' 6 000	2½St.35' 4 000
L-3	RESIDENTIAL - 1 & 2 FAMILY		☒	☒	14 000	4St.50' 11 000	3St.40' 7 500	4St.50' 11 000	4St.50' 10 000	3St.40' 7 500	3St.40' 6 000	2½St.35' 4 000
M	MISCELLANEOUS & TEMPORARY											

Note a.—For all buildings with frontages of more than twenty-five (25) per cent of the building perimeter on one or more streets or other accessible public space not less than thirty (30) feet wide, the tabular area may be increased two (2) per cent for each one (1) per cent of such excess. (See section 308.)

Note b.—In use groups B-1, B-2, C, D and E, the tabular areas may be increased two hundred (200) percent for one (1) story buildings and one hundred (100) percent for buildings over one (1) story in height when such buildings are equipped with automatic sprinkler systems not specifically required by law. (See section 308.)

Note c.—Eliminated.

Note d.—The maximum total floor area shall not exceed three and one-half (3½) times the tabular value. (See section 308.3.)

Note e.—In use groups B, C, D, E and F-3, isolated buildings of other than frame construction may be of unlimited areas outside of the fire limits when not more than one (1) story or eighty-five (85) feet in height when complying with specific provisions of the Basic Building Code. (See section 309.)

Note f.—In use groups B-1, B-2, C, D and E, types 1, 2 and 3 constructon may be increased one (1) story but not more than twenty (20) additional feet in height when equipped with automatic sprinkler systems not specifically required by law. (See section 310.2.)

Note g.—Church auditoriums of type 3-A construction may be erected to sixty-five (65) feet in height and of type 4 construction to forty-five (45) feet in height.

Note h.—For exceptions to height and area limitations of high hazard use buildings, see article 4 governing the specific use. For other special fire-resistive requirements governing specific uses, see section 905.

Note i.—For height and area exceptions covering public parking decks, see section 905.2.

Note j.—For height and area exceptions covering petroleum bulk-storage buildings, see section 905.3.

Note k.—For exceptions to height of multi-family dwellings of types 2-B and 3-B construction, see section 905.6.

Note l.—In multi-story buildings, the limiting areas specified in table 6 shall be reduced as regulated by section 307.3.

Note m.—For one-story combustible fibre warehouses, see section 410.17.

APPENDIX F.—RECOMMENDED NAILING SCHEDULE

Building element	*Nail type*	*Number and distribution*
Stud to sole plate	Common-toe nail	3—16d
Stud to cap plate	Common-end nail	2—16d
Double studs	Common-direct	10d 12″ o.o. or 16d 30″ o.o.
Corner studs	Common-direct	16d 30″ o.o.
Sole plate to joist or blocking	Common	20d 16″ o.o.
Double cap plate	Common-direct	16d 24″ o.o.
Cap plate laps	Common-direct	3—16d
Ribbon strip—6″ or less	Common-direct	2—10d each bearing
Ribbon strip—over 6″	Common-direct	3—10d each bearing
Roof rafter to plate	Common-toe nail	3—16d
Roof rafter to ridge	Common-toe nail	2—16d
Jack rafter to hip	Common-toe nail	3—10d
Floor joists to studs (no ceiling joist)	Common-direct	5—10d or 3—16d
Floor joists to studs (with ceiling joists)	Common-direct	2—10d
Floor joists to sill or girder	Common-toe nail	2—16d
Ledger strip	Common-direct	3—20d at each joist
Ceiling joists to plate	Common-toe nail	2—16d
Ceiling joists to alt. rafters	Common-direct	3—16d
Ceiling joists (laps over partition)	Common-direct	3—16d
Collar beam	Common-direct	4—10d
Bridging to joists	Common-direct	2—8d each end
Diagonal brace (to stud and plate)	Common-direct	2—8d each bearing
Tail beams to headers (when nailing permitted)	Common-end nail	1—20d each 4 sq. ft. floor
Header beams to trimmers (when nailing permitted)	Common-end nail	1—20d each 8 sq. ft. floor
(1″) sub-flooring 6″ or less	Common-direct	2—8d each joist
(1″) sub-flooring 8″ or more	Common-direct	3—8d each joist
(2″) sub-flooring	Common-direct	2—20d each joist
(1″) sheathing—8″ or less	Common-direct	2—8d each stud or rafter
(1″) sheathing—over 8″	Common-direct	3—8d each stud or rafter
Plywood sheathing	Common-direct	6d 5″ o.o. exterior edges
Plywood sheathing	Corrosion resistive	6d 10″ o.o. intermediate
Roof sheathing—6″ or less	Common-direct	2—8d each rafter
Roof sheathing—over 6″	Common-direct	3—8d each rafter
Fiber board sheathing	Common-direct	8d—6″ o.c. intermediate 8d—3″ o.o. exterior edges
Gypsum sheathing	Large head	7—No. 11g. x 1¾″ per bearing under shingles 4 per bearing all other cases
Shingles—wood	Corrosion resistive	2—No. 14 B&S each bearing
Weather boarding	Corrosion resistive	2—8d each bearing

Shingle nails shall penetrate not less than ¾ inch into nailing strips, sheathing or supporting construction except as otherwise provided in section 111.62.

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Abridged Building CODE

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PREFACE

This first supplement to the 1955 edition of the Abridged Building Code contains changes proposed during the preparation of the text for that edition but not available in time to be processed under approved procedures prior to publication date. Many of them could not be considered earlier because the technical study and scientific developments on which they are based had not been completed.

The publication of this supplement is a part of the active building code program of the Building Officials Conference of America, Inc. This program makes modern, up-to-date building codes available to communities at nominal costs for adoption by local governments and provides services enabling maintenance of these codes in line with developments in the construction industry at minimum expense.

Proposed changes originate from research and determination of new materials, methods or procedures, and an ever increasing use of the BOCA building codes. They are carefully studied by committees of well qualified building officials from various size, widely distributed communities. The committees hold public hearings and recommend disposition of each change to the general membership. Final decision on changes is made by public officials at open hearings at the national meeting.

Not all proposed changes are accepted. Local groups considering the BOCA building codes and approved changes are frequently approached by interests recommending changes other than those which have been approved. Some of these may have been considered and found not to be in the public interest or compatible with the balance of the code. Adoption of such changes by local governments has sometimes later proved undesirable. Information and recommendation regarding any change, either approved by the Conference or submitted directly to a local community, may be obtained from the BOCA executive office.

The revisions of the Abridged Building Code (1955) published by the Building Officials Conference of America, Inc. contained in this supplement were approved by the membership of the Conference at the 40th Annual Meeting in Milwaukee, Wisconsin, April 18 to 21, 1955, as desirable changes to clarify the provisions or make possible the use of new materials, methods of construction or devices proved to produce adequate safety.

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Executive Offices
110 East 42nd Street, New York 17, N. Y.

APPROVED CHANGES—1955

Recommended by the membership of the Building Officials Conference of America for the

ABRIDGED BUILDING CODE—1955

Sec. 101.0. (S23-55).

Change term defined from "public parking deck" *to* "parking structure" *without change in definition.*

Sec. 107.27. (S2-55).

Change section to read as follows:

107.27. **Roof Structures.**—Aerial supports, clothes dryers and similar structures less than twelve (12) feet in height, water tanks and flag poles may be erected of wood or other approved materials; cooling towers erected on roofs of buildings within fire districts shall be constructed of noncombustible materials, except that drip bars may be of wood.

Sec. 107.64. (S23-55).

Change title and reference to structure from "Public Parking Decks" *to* "Parking Structures", *leaving balance of first sentence unchanged. Delete second sentence, change last sentence as indicated, and insert table with changes from requirements of second sentence as indicated so that section reads as follows:*

107.64. **Parking Structures.**—Parking structures may be erected as follows without enclosure walls except that an enclosure wall with not less than two (2) hours fireresistance, without openings therein, shall be provided when located within six (6) feet of interior lot lines. Continuous wheel guards not less that eight (8) inches in height shall be located three (3) feet from the outside edge of the structure with a continuous protective guard rail not less than three and one-half (3½) feet in height around the outside perimeter of the structure on each parking level.

Heights and areas of parking structures shall not exceed the limits in the following table. The area of structures facing on more than one (1) street may be increased as provided in note "a" of table 6 and section 308.1 of the Basic Code.

HEIGHT AND AREA LIMITATIONS FOR PARKING STRUCTURES

Type of Construction	Height	Area in Square Feet
1-A and 1-B	Unlimited	Unlimited
2-A	7 Stories	30,000
2-B	5 Stories	30,000
2-C	3 Stories	30,000
2-C Primary frame hot-rolled structural steel	4 Stories	30,000
2-A and 2-B	1 Story	Unlimited

Note. The above limits of height permit parking on top level of structure.

Sec. 109.1. Table 4. (S23-55).

Change "Public parking decks" *to* "Parking structures".

Sec. 111.5. (S11-55 Pt. 3).

Delete title and substitute the following and change wording of section as follows:

111.5. **Sheathing, Decking and Plywood Subflooring.**—Exterior walls of enclosed frame buildings shall be sheathed as herein provided. Roofs than twelve (12) inches on all sides of the stack, unless insulated to prevent a temperature greater than two hundred and fifty (250) degrees F. on the exterior exposed surface.

Sec. 113.21. (S25-55 Pt. 3).

Change section to read as follows:

113.21. **Solid and Liquid Fuel-Fired Equipment.**—In lieu of masonry chimneys for solid and liquid fuel-fired equipment, in buildings not over two and one-half (2½) stories high, chimney assemblies of approved acid, weather and heat resisting materials may be constructed as herein provided. Such assemblies shall be designed and constructed so as to prevent a temperature greater than two hundred and fifty (250) degrees F. on the exterior exposed surface. All combustible material shall be maintained with a clearance of not less than two (2) inches from the outside surface of the assembly. Chimney assemblies tested and approved by the Underwriters' Laboratories, Inc., or other accredited authoritative agencies for use with solid and liquid fuel-fired equipment may be accepted for such use by the building official when installed with the clearings and details of installation so approved.

Sec. 113.22. (S25-55 Pt. 4).

Change section to read as follows:

113.22. **Gas Fuel-Fired Equipment.**—In lieu of masonry construction, chimneys for flues and vent connectors from gas fuel-fired appliances in buildings not over two and one-half (2½) stories high, may be constructed with a lining of approved corrosion resistive materials enclosed in an insulating wall of acid and heat resisting metal. The enclosure shall be so constructed and designed as to prevent a temperature greater than two hundred and fifty (250) degrees F. on the exterior exposed surface. Clearances shall be maintained from combustible construction as provided in section 113.21. Chimney assemblies tested and approved by the Underwriters' Laboratories, Inc., or other accredited authoritative agencies for use with gas fuel-fired equipment may be accepted for such use by the building official when installed with the clearances and details of installation so approved.

Appendix B. (S33-55 Pts. 1-4 and E45-55).

Add the following standards as shown:

Building Code Requirements for Interior Lathing and Furring	ASA A42.4-1955
Design, Fabrication and Erection of Structural Steel for Buildings	AISC-1949
Specifications for Assembly of Structural Joints using High Strength Steel Bolts . . . Approved by Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation; Endorsed by	AISC Feb.-1954
Plywood (Douglas Fir Standard)	USDC CS45-55

Appendix B. (***Continued***)

Make the following revisions and additions to standards shown:

Building Code Requirements for Gypsum Plastering.......ASA A42.1-55

Structural Steel for Buildings, Design, Fabrication and Erection. (See Design, Fabrication and Erection of Structural Steel for Buildings.)

Appendix C. (S34-55).

Add the following:

12. Type "X" Gypsum Wallboard complying with ASTM C36-54 as a special fire-retardant wallboard.

Appendix C-2. (S35-55).

Add the following to existing listing as shown:

Type of Partition	Thickness in Inches
	3 hours
Hollow gypsum blocks	3 P. 2. S. 4 P. 1. S.

Appendix C-3. (S36-55).

Delete listing "2"x4" studs, gypsum board" (1*st item*) *and all descriptions opposite thereto under all hourly ratings and add the following tables at end of appendix C-3*:

2" x 4" studs, gypsum lath and plaster.

Item	Fire Resistance Rating Hours	Description	Type of Lath	Plaster			Refr.
				Aggregate	Mix (c)	Thickness (a)	
1	1(b)	Gypsum Plaster on Gypsum lath	⅜" Perf.	Perl. or Verm.	Mix 1	½"	Present Code
2	1	Gypsum Plaster on Gypsum lath. Lath attached with metal clips	⅜" Perf.	Perl. or Verm.	Mix 1	½"	Ohio State T118
3	1	Gypsum Plaster on Gypsum lath	⅜" Perf.	Sand	Mix 2	½"	Present Code
4	1	Wood-fibered gypsum Plaster on Gypsum lath	⅜" Plain	—	Neat	½"	Present Code
5	1	Gypsum Plaster on Gypsum lath attached by nails fitted with 1½" x 1¾" metal lath pads folded over nail heads	⅜" Plain	Sand	Mix 2	½"	B MS 92
6	¾	Gypsum Plaster on Gypsum lath	⅜" Plain	Sand	Mix 2	½"	Present Code B MS 92

Note a. Thickness measured from face of lath and includes finish coat.

Note b. 1½ hours non-load bearing.

Note c. Mix proportions:
Mix 1. 100 lbs. gypsum to 2½ cu. ft. aggregate
Mix 2. 100 lbs. gypsum to 200 lbs. aggregate

Note. All construction shall conform to the construction of the test specimen.

Appendix C-3. (*Continued*)

2″x4″ studs, gypsum wallboard.

Item	Fire Resistance Rating Hours	Gypsum Wallboard (a)					
		Thickness of board	No. of layers (a)	Total Thickness (a)	Type of Wallboard	Remarks	Reference
1	2	⅝″	2	1¼″	Type "X"		Ohio St. T-194
2	1	⅝″	1	⅝″	Type "X"		U. L.
3	1	⅜″	2	¾″	Regular	Second layer cemented to first	Ohio St. T-118
4	1	½″	2	1″	Regular		N. B. S.
5	1	½″	1	½″	Regular	Stud spaces filled with mineral wool. Batts nailed in place	B. M. S. 92
6	¾	½″	1	½″	Type "X"		U. L.
7	½	½″	1	½″	Regular		B. M. S. 92

Note a. Each side finished as noted.

Note. All construction shall conform to the construction of the test specimen.

Appendix C-4. (S37-55).

Delete listing under "2 hour" *and second and third listings under* "1 hour" *opposite* "Studless solid partitions" (*7th item*), *and add the following table at end of appendix C-4*:

Solid gypsum lath and plaster partitions.

Item	Fire Resistance Rating Hours	Lath	Plaster			Total (a) Thickness	Reference
			Aggregate	Mix (c)	Thickness (each side)		
1	2	½″	Perl. or Verm.	Mix 1	1″	2½″	NBS 300 & 301 and present code
2	1½	½″	Perl. or Verm.	Mix 1	¾″	2″	NBS 282 & 283
3	1 (b)	⅜″	Sand	Mix 3	½″ & 1¼″	2⅛″	Columbia Univ. FW2
4	1	⅜″ or ½″	Sand	Mix 2	13/16″ or ¾″	2″	Present code

Note a. Thickness includes finish coat

Note b. Steel Stud Supports

Note c. Mix proportions:

Mix 1. Scratch coat—100 lbs. gypsum to 2 cu. ft. aggregate
Brown coat—100 lbs. gypsum to 3 cu. ft. aggregate

Mix 2. Scratch coat—100 lbs. gypsum to 100 lbs. sand
Brown coat—100 lbs. gypsum to 200 lbs. sand

Mix 3. Scratch and brown coats—100 lbs. gypsum to 100 lbs. sand

Note. All construction shall conform to the construction of the test specimen.

Appendix C-6. (S38-55 Pts. 1 and 2).

Delete the listing "Vermiculite or perlite plaster on gypsum lath" *and all descriptions opposite thereto under* 4 *hour,* 3 *hour and* 2 *hour ratings and add the following table at end of appendix C*-6:

Gypsum lath and plaster.

		Gypsum Lath		Plaster				
Item	Fire Resistance Rating Hours	Type	No. of Layers	Aggregate	Thickness (a)	Mix (c)	No. of Coats	Total Thickness
1	1	⅜″ Perf.	1	Sand	½″	Mix 1	1	⅞″
2	1½	⅜″ Perf.	1	Sand	⅝″	Mix 1	1	1″
3	2	⅜″ Perf.	1	Perl. or Verm.	1″	Mix 2	1	1⅜″
4	3	⅜″ Perf.	1	Perl. or Verm.	1⅜″	Mix 3	2	1¾″
5	3	⅜″ Perf.	1	Sand	2″	Mix 4	2	2⅜″
6	4	½″ Plain	2	Perl. or Verm.	1½″ (b)	Mix 3	2	2½″

Note a. Thickness includes finish coat

Note b. 1″ 20 ga. wire mesh between scratch and brown coats

Note c. Mix proportions:

Mix 1. 100 lbs. gypsum to 250 lbs. sand

Mix 2. 100 lbs. gypsum to 2½ cu. ft. perlite or vermiculite

Mix 3. Scratch coat—100 lbs. gypsum to 2 cu. ft. perlite or vermiculite
Brown coat—100 lbs. gypsum to 3 cu. ft. perlite or vermiculite

Mix 4. Scratch coat—100 lbs. gypsum to 200 lbs. sand
Brown coat—100 lbs. gypsum to 300 lbs. sand

Note. All construction shall conform to the construction of the test specimen.

Add the following new listings at end of appendix C-6:

Gypsum wallboard.

Item	Fire Resistance Rating Hours	Wallboard	No. of layers	Total Thickness	Application (a)	Refr.
1	1	½″ Reg.	2	1″	First layer bonded to column flanges with joint-adhesive and wire tied with 2 strands 18 ga. wire on 15″ centers. Second layer adhesively applied to first layer.	NBS #303
2	1½	½″ Reg.	3	1½″	First two layers adhesively bonded and clinch-nailed together and then adhesively bonded to column and wire tied with 2 strands of 18 ga. wire on 15″ centers. Third layer adhesively applied to second layer.	NBS #304
3	2½	½″ Reg.	4	2″	First layer bonded to column flanges with joint adhesive. Second layer adhesively applied to first layer, third layer adhesively applied to second layer, third layer wire-tied with 2 strands 18 ga. wire on 15″ centers. Fourth layer adhesively applied to third layer.	NBS #315

Note a. The pieces which span the re-entrant spaces cut to bear on edges of both the flanges and the wallboard on the flanges. Outside corners finished with tape and joint adhesive in accordance with requirements of ASA Standard A97.1.

Note. All construction shall conform to the construction of the test specimen.

Appendix C-8. (S39-55).

Make the following additions and deletions under headings shown:

Type of Construction	Over-all thickness inches	Fire resistance rating hours
—Add the following under:		
Structural steel framing with formed long span steel floor deck and portland cement or vermiculite concrete floors and ceiling protection as described.		
Metal lath suspended (¾″ furring channels 12″ o.c.) ceiling with ¾″ gypsum and perlite or vermiculite plaster and ½″ acoustical plaster. Basecoat mix proportions, scratch coat 100 lbs. gypsum to 2 cu. ft. aggregate and brown coat 100 lbs. gypsum to 3 cu. ft. aggregate. (NBS Test No. 338)	2½″ top floor slab	4
⅜″ perforated gypsum lath suspended ceiling (¾″ furring channels 12″ o.c.) with ½″ gypsum perlite or vermiculite plaster reinforced with 14 gage galvanized wire installed below lath and diagonally between interlocking device of wire clips. Scratch coat 100 lbs. gypsum plaster to 2 cu. ft. aggregate and brown coat 100 lbs. gypsum plaster to 3 cu. ft. aggregate. (NBS Test No. 337)	2½″ top floor slab	3
—Delete the following under:		
Wood joist framing—double flooring—layer of 14 lb. felt insulation.		
Ceiling of ½″ gypsum board and casein paint		⅓
Ceiling of ⅜″ gypsum board and asbestos paper		⅓
Ceiling of ⅜″ gypsum board and ½″ gypsum plaster		½
Ceiling of ½″ gypsum board and asbestos paper		½
Ceiling of two ⅜″ gypsum boards		½
Ceiling of two ⅜″ gypsum boards and ½″ gypsum plaster		¾
Ceiling of ⅜″ perforated gypsum board and ½″ gypsum plaster, 3″ metal lath strips over joints		1
Ceiling of ⅜″ gypsum lath—½″ perlite or vermiculite plaster with chicken wire reinforcing		1¾

Appendix C-8. (*Continued*)

—*Add the following tables at end of appendix C-8:*

Floor-ceiling constructions—gypsum lath and gypsum plaster.

Note—All floor-ceiling constructions consist of a 2″ Portland Cement concrete slab poured over ribbed metal lath unless otherwise noted, supported by bar joists spaced 24″ on centers and a ceiling of gypsum plaster on gypsum lath attached by wire clips to furring channels which, in turn, are wired to the joists.

Item	Fire Resistance Rating Hours	Spacing ¾″ Furring Channels	Gypsum Lath	Gypsum Plaster				Reference
				Aggregate	Mix (e)	Thickness (b)	Reinforcement	
1	4	12″	⅜″ Perf.	Perl. or Verm.	Mix 2	1″	1″ 20 ga. wire mesh(f)	BMS 141
2	3	12″	⅜″ Perf.	Perl. or Verm.	Mix 2	⅝″	14 ga. diag. wire(c)	BMS 141
3	3	16″	⅜″ Perf.	Perl. or Verm.	Mix 1	½″	1″ 20 ga. wire mesh(f)	BMS 141
4	2½	12″	⅜″ Perf.	Perl. or Verm.	Mix 1	1⅛″ (d)	14 ga. diag. wire(c)	BMS 141
5	2	16″	⅜″ Perf.	Perl. or Verm.	Mix 1	½″	14 ga. diag. wire(c)	BMS 141
6	2(a)	12″	⅜″ Perf.	Perl. or Verm.	Mix 2	⅝″	14 ga. diag. wire(c)	NBS 343
7	1½	16″	⅜″ Perf.	Perl. or Verm.	Mix 2	1″	None	BMS 141
8	1	16″	⅜″ Perf.	Perl. or Verm.	Mix 1	⅝″	None	BMS 141

Note a. Floor or roof of 2″ reinforced gypsum concrete on ½″ gypsum formboard.

Note b. Thickness includes finish coat and is measured from the face of gypsum lath.

Note c. 14 gage galvanized wire reinforcing installed below lath and diagonally between interlocking device of wire clips.

Note d. Thickness includes ½″ basecoat and ⅝″ acoustical plaster.

Note e. Mix Proportions:

Mix 1. 100 lbs. gypsum plaster to 2½ cu. ft aggregate

Mix 2. Scratch coat—100 lbs gypsum plaster to 2 cu. ft. aggregate
Brown coat—100 lbs. gypsum plaster to 3 cu. ft. aggregate

Note f. Wire mesh tied to each furring channel or interlocking clip at each junction between edges of lath

Note. All construction shall conform to the construction of the test specimen.

Appendix C-8. (*Continued*)

Wood joist framing—double flooring—layer of 14 lb. felt insulation and ceilings of gypsum lath and gypsum plaster.

Item	Fire Resistance Rating Hours	Description of Ceiling	Descr. of Lath	Plaster			Reference
				Aggregate	Mix (b)	Thickness (a)	
1	½	Gypsum Plaster on Gypsum Lath	⅜″ Plain	Sand	Mix 1	½″	Present code
2	¾	Gypsum Plaster on Gypsum Lath	⅜″ Perf.	Sand	Mix 1	½″	NBS Fl. Fire Test #22
3	1	Gypsum Plaster on Gypsum Lath	⅜″ Perf.	Perl. or Verm.	Mix 3	½″	Present code 52
4	1	Gypsum Plaster on Gypsum Lath 3″ strips of metal lath over all joints	⅜″ Perf.	Sand	Mix 1	½″	BMS 92
5	1	Gypsum Plaster on Gypsum Lath 3″ strips of metal lath over all joints	⅜″ Plain	Sand	Mix 2	½″	Columbia Univ. #F.W. 56
6	1½	Gypsum Plaster on Gypsum Lath 1″ 20 ga. wire mesh reinforcing	⅜″ Perf.	Perl. or Verm.	Mix 3	½″	Present code

Note a. Thickness is measured from face of lath and includes the finish coat

Note b. Mix proportions:

Mix 1. 100 lbs. gypsum plaster to 200 lbs. sand

Mix 2. 100 lbs. wood-fiber gypsum plaster to 50 lbs. sand

Mix 3. 100 lbs. gypsum plaster to 2½ cu. ft. of perlite or vermiculite

Note. All construction shall conform to the construction of the test specimen.

Wood joist framing—double flooring—layer of 14 lb. felt insulation and ceilings of gypsum wallboard.

Item	Fire Resistance Rating Hours	Ceiling Construction				Remarks	Reference
		Thickness of board	No. of layers	Total Thickness	Type of Wallboard		
1	½	⅜″	2	¾″	Regular		BMS 92 Present code
2	½	½″	1	½″	Regular	Covered with asbestos paper	BMS 92 Present code
3	¾	½″	1	½″	Type "X"		U. Lab
4	¾	½″	2	1″	Regular		Present code NBS FR 2211
5	1	⅝″	1	⅝″	Type "X"		U. Lab
6	1	½″	2	1″	Regular	1″ 20 ga. wire mesh between layers	Present code

Appendix F. (S13-55).

Change requirements for nailing of plywood sheathing as follows:

Building Element	*Nail type*	*Number and distribution*
Plywood sheathing	Common direct	6d 12″ o.c. intermediate 6d 6″ o.c. exterior edges